



12-17-2015

# The Environmental Impacts of Colonialism

Lawrence Wood

Follow this and additional works at: [http://vc.bridgew.edu/honors\\_proj](http://vc.bridgew.edu/honors_proj)



Part of the [Geography Commons](#)

---

## Recommended Citation

Wood, Lawrence. (2015). The Environmental Impacts of Colonialism. In *BSU Honors Program Theses and Projects*. Item 119. Available at: [http://vc.bridgew.edu/honors\\_proj/119](http://vc.bridgew.edu/honors_proj/119)  
Copyright © 2015 Lawrence Wood

This item is available as part of Virtual Commons, the open-access institutional repository of Bridgewater State University, Bridgewater, Massachusetts.

# The Environmental Impacts of Colonialism

Lawrence Wood

Submitted in Partial Completion of the  
Requirements for Departmental Honors in Geography

Bridgewater State University

December 17, 2015

Dr. Vernon Domingo, Thesis Director  
Dr. James Hayes-Bohanan, Committee Member  
Dr. Madhu Rao, Committee Member

# Environmental Impacts of Colonialism

---

Lawrence Wood

12/14/2015

**Abstract:** The politics of the global imperial era are having real-world environmental consequences globally, especially in the former colonies. Indifferent administration by overseas imperial powers transparently sought to enrich their home country with little to no thought about the long term environmental or political consequences for the colony. One of the main objectives of global imperialism, from the first Spanish colonies to the last of the British and Portuguese colonies, was the enhanced profitable extraction of resources. The industrial revolution fueled the need for colonial resource extraction. Industrialization and imperialism formed a positive feedback loop, in which one created a greater need for the other. As the dance between industrialization and imperialism grew faster less care was paid toward environmental concerns. This cycle played out until global power was consolidated by a few global empires on a scale unprecedented in human history, by the early 20th century. Then the massive geo-political traumas of the 21st century caused these global empires to collapse and created many “experienced-distant” countries. These countries were based off arbitrarily drawn zones of administration, causing them to be plagued with internal political and sovereignty issues. These destabilizing forces have left many post-colonial governments unable to properly manage the environmental scars left by global imperialism, and often these scars would be made deeper as a result of the geopolitical chess of the Cold-War and as well as decades following.

## Contents

Introduction .....	2
Direct Environmental Impacts of Colonialism .....	5
Impacts on Isolated Ecosystems.....	7
Strip-Mining of Nauru.....	7
Desiccation of the Aral Sea.....	10
The Spanish Empire in the Andes:.....	13
The Relationship in Between Colonial Control and Deforestation:.....	20
American March across the Great Plains .....	21
Madagascar and the Ecological cost of Displacement: .....	24
Transition into the Industrial Period:.....	27
Environmental Impacts of Colonial Legacies .....	31
Experience-Distant States .....	32
Overall Environmental Legacies of Experience Distant States .....	36
Nigeria and Angola: Two Nations Under Shell .....	38
Nigeria .....	39
Angola: the issue of Cabinda .....	42
DeBeers, Firestone, and Charles Taylor .....	44
The Congo: A Toxic Relationship between Power and its People .....	47
Colonialism and Climate Change .....	52
Islands as Center of Colonialism and Climate Change.....	55
Indonesia .....	56
Primate Cities and the Coastal Core Region.....	62
Migration.....	64
Transnational Armed Groups in the Sahel .....	65
Conclusion .....	67
Works Cited .....	70



## Introduction:

This objective of this project is to define the role of the global imperial powers in damaging the environment of the 21st century. It will investigate how the world we inhabit today is a direct result of the actions of global imperial powers; the good, the bad, and the outright horrific. These empires (at first, exclusively European) expanded their spheres of influence with a bayonet mandate across the globe with far more consideration given to outmaneuvering their imperial rivals in geo-political chess than to the long term impacts of their actions on the people and natural environments of their colonial possessions. This project will focus on three main areas of imperial induced environmental degradation:

A: How global imperial powers directly damaged the environments within the colonies that they controlled via resource extraction and cash crop production

B: How the negative social, economic, and political legacies of these former colonies have furthered environmental degradation in these regions after gaining independence.

C: How global empires of the past 400 years played a disastrous in creating anthropogenic climate change and how former colonies will have to bear the brunt of climate change impacts

The time frame of the project spans a 550 year period, from the Columbian exchange through the modern day. For analysis purposes, this time period will be split into four time periods: the pre-industrial period, the transitional period, the industrial period, and the post-colonial period. The Second World War stands out a clear delineation in between the industrial period and the post-colonial period.

The post-colonial period focuses on the new nations that had arisen for the ashes of the former global European empires; as two massive European conflicts rendered these powers unable to maintain their grip on their far-flung colonies. This period is also shaped by the Cold War between the United States and the Soviet Union. The other periods lack such a definitive

delineation, and therefore will be defined using the Kondratieff cycles of global growth and stagnation as well as the logistics wave's concept (see table 1 below). The industrial period starts roughly in the middle of cycle II and represents a fundamental change in colonialism as global capitalism and global imperialism to form an exploitive feedback-loop. The transition into the industrial period in cycle I section B and is marked by the decline of the Iberian powers and the rise of steam power. The first period will begin during the pre-Kondratieff, logistic waves of imperialism, shown in table 2 (Flint & Taylor, 2011, pp. 23-26). The table in figure 2 also illustrates how variation of number of territories under colonial rule over the time periods of this project. This period will be referred to as the pre-industrial imperial period, where European empires spread across the Americas and established trading footholds across Africa and Asia. This period brought about the beginnings of globalization and was dominated by the Spanish and the Portuguese. The differences in structure and objectives will be discussed later in the paper.

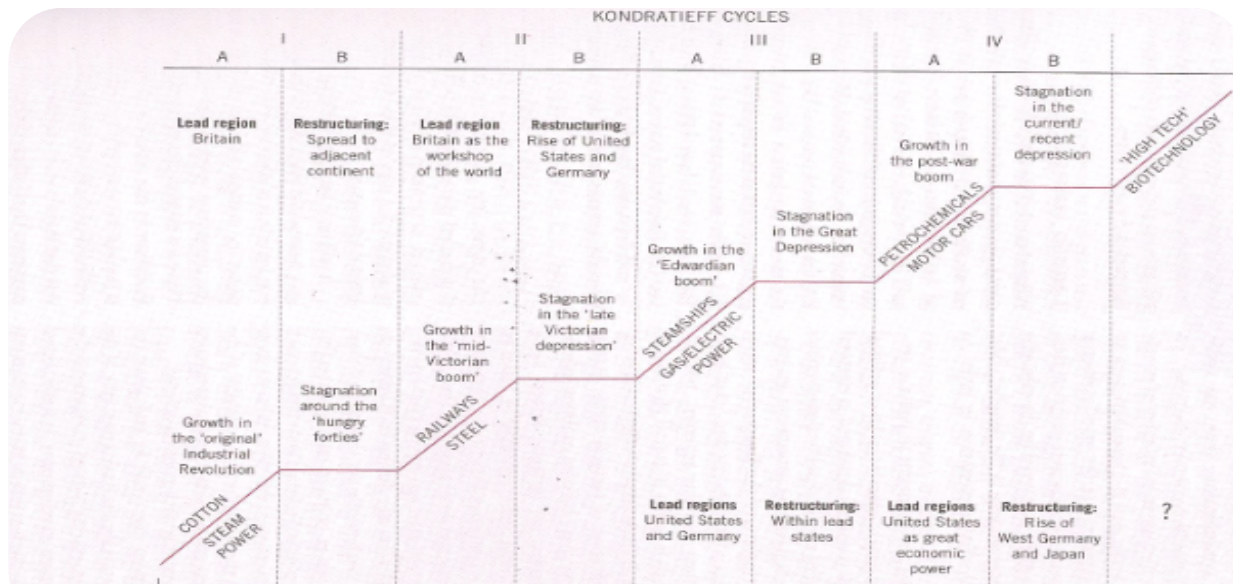


Table 1: (Flint & Taylor 2011, pp. 23)

## Fluxuations in Colonial Control

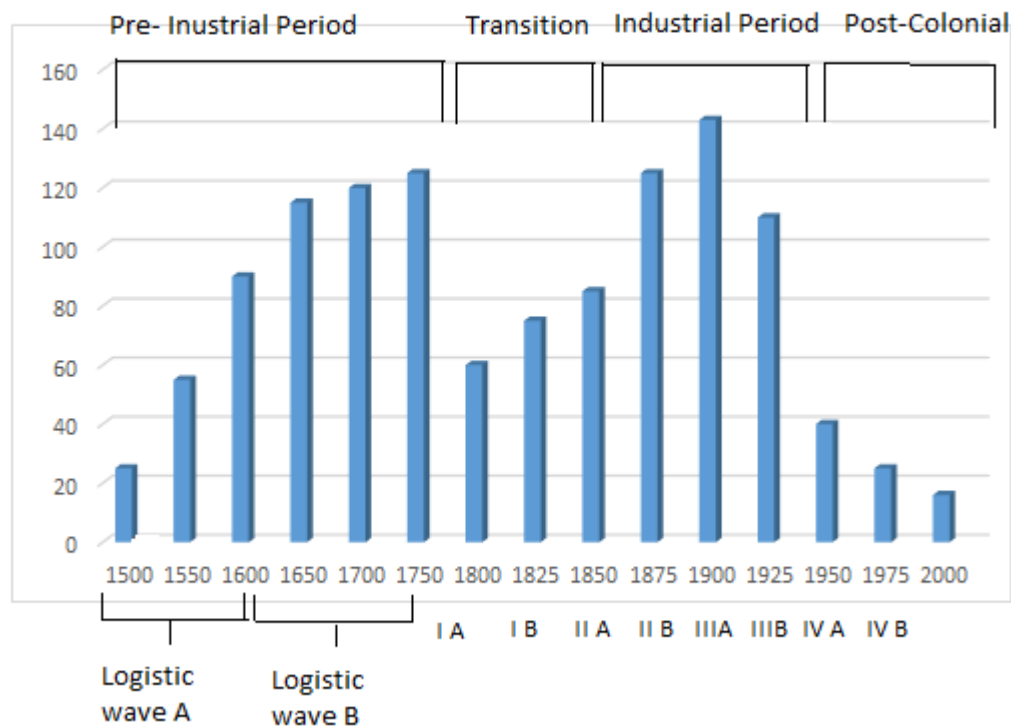


Table 2: Number of colonies held over time. Data sources: (Flint, Taylor 2011) and UN datasets on global decolonization

To aid in the analysis of topic, satellite imagery and maps generated using Geographic Information Systems will be incorporated into this research. The main software used is GIS software named ArcMap. This software will be used to classify Digital Elevation Models (DEMs) and to provide analysis overlays on a series of maps. This allows for information from historical maps to be combined socio-economic data as well as remotely sensed physical geography data; incorporating all aspects of place into the analytical process. All DEMs have been acquired from the World Wildlife Foundation's and United States Geological Service's HYDROSHED project and all satellite imagery are from the LANDSAT satellites and were acquired from the USGS Glovis portal. These tools allow for a unique analysis of the colonial environment over the vast scales of global imperialism by allowing integration of the physical, political, biological, economic, and cultural geographies that overlap and intertwine in this complex global power system. Understanding the results of this complex integration is both the key to understanding the true environmental impact of global imperialism and the hallmark of geography as analytical framework.

### **Direct Environmental Impacts of Colonialism**

The ultimate goal of colonial empires is to enrich the empire, both in trade and in resources. This was accomplished with the mechanisms of natural resource extraction and cash crop production. These were often undertaken with (at best) reluctant concern and at worst negligible concern for the local environment (Fairhead & Leach, 2000). The strain of the sheer geographic expanse of global imperialism on the resources of the colonizer, meant that long term environmental impacts (often like the concern for the wellbeing of the indigenous populations)

were pushed to the sides in an attempt to make profit out of the very expensive enterprise of controlling a significantly-sized colony.

The economic pressures of running and maintaining a sizable foreign colony can be best illustrated by the rise and fall of the Dutch East India Company, otherwise known by its Dutch acronym, the *VOC*. It was founded in 1602 by Dutch merchants and was sponsored by the Dutch government, giving the company a monopoly on Asian imports, the right to declare war, raise an army, and create laws to govern its employees. The *VOC* had set out to establish a total monopoly on Asian imports, and would engage in many armed conflicts in an attempt to establish this monopoly at the expense of the Portuguese, British, and local Indonesians. Although this was never fully accomplished, the *VOC* set up an impressive trade network that spanned from the 'Far East' (China and Japan), throughout the islands of the Indian Ocean, to Europe, and (with the help of its counterpart the Dutch West India company) across the Atlantic into the Caribbean. During the late 17<sup>th</sup> century and the early 18<sup>th</sup> century, the *VOC* would establish political control across modern-day Indonesia, Sri Lanka, South Africa. The cost of the territorial conflicts needed to defend these colonies combined with the overhead of the *VOC*'s overhead (1500 ships and roughly half a million employees) decimated the company's profits to the point until it was no longer solvent by the turn of the 19<sup>th</sup> century (Koot, 2015).

The *VOC* would be resigned to history much like its counterpart and rival, the British East India Company, as it proved it could not handle the effective administration of a territory and turn a profit. This demonstrates that the profitability of over-seas colony is almost always short lived for the colonizing power itself. The cost of installing and maintaining institutions and infrastructure quickly eats away at any economic advantage of any monopoly established by the colonizer. This economic pressure will play a major role in the environmental damages that

resulted from colonialization. As time goes on there is little room in the profit margins to take into account the rights of the indigenous populations or any possible side effects of resource extraction.

### **Impacts on Isolated Ecosystems**

Extreme geographic isolation can produce incredibly unique ecosystems with species of flora and fauna that simply could not exist anywhere else on the planet. These ecological gems can take hundreds of thousands of years to create and could hypothetically contain thousands of life forms simply unknown to science. However, a few decades of environmental mismanagement by using one-size-fits-all methods of resource extraction can destroy these ecosystems. The organisms affected have nowhere to migrate and often struggle to survive in this rapidly alien environment; one that is fundamentally different than the one the species had adapted to over millennia.

### **Strip-Mining of Nauru**

Sailors of the 19th century considered Nauru to be a tiny tropical gem in the middle of a vast stretch of the Pacific Ocean in between Hawaii and Australia. However the discovery of phosphates on the island in 1900 by its original German colonizers would alter the island's history forever. Nauru covers a mere 22 square kilometers, and is composed of two basic geographic regions; a thin coastal plain that rings the island, and a central plateau where the phosphates were deposited. Phosphates are crucial chemicals in creating synthetic fertilizers, which are vital in increasing agricultural productivity. In order to reach the purest phosphate deposits all of the vegetation and the top layers of the soil were removed. Roughly 80% of the island would be strip-mined in this fashion (shown above); leaving a virtual moonscape marred by steep pits that is almost completely devoid of plant and animal life (Manner, Thaman, & Hassall, 1984)



In the 68-year span of colonial rule in Nauru the Germans (up until the end of the First World War), the British (until 1920), and finally the Australians, would extract roughly 34 million ton of phosphates at well below international market prices (Gowdy & McDaniel, 1999). Although the post-colonial Nauruan governments continued to exploit the island's phosphate resources until the islands reserves had become completely depleted, the ecological condition in

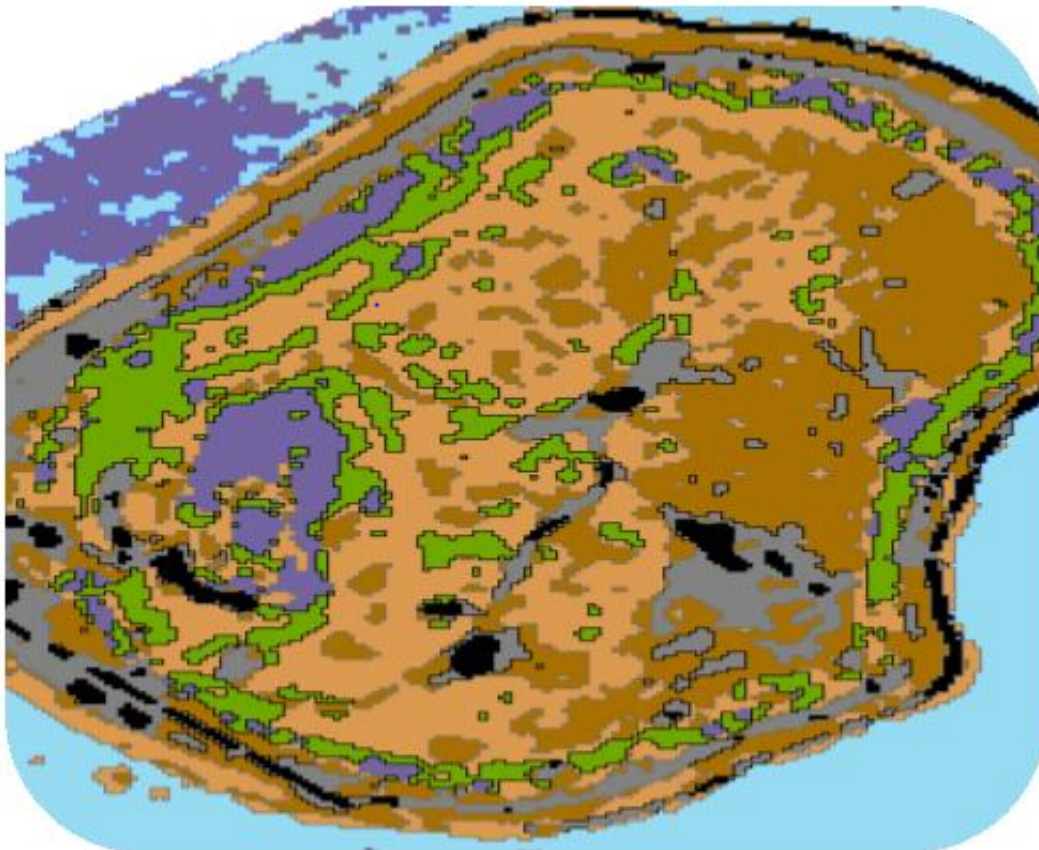


Figure 1: Former phosphate mine on Nauru, showing the exposed coral columns

Source: Reuters

which the colonial powers left the newly independent island republic in 1968, gave those people very few options. Gowdy and McDaniel speculated that, “The process of colonialism turned Nauruan’s from a self-sufficient people, living within the resources of Nauru into economic persons.” This was especially true since the population of the island grew by a factor of 10

during the colonial period, far out pacing the food and water resources. The deforestation of the highland plateau has caused the micro climate of the island to become dryer, increasing the variability in precipitation. The ecology of the island is slowly recovering; however it could take centuries and most likely will not have a semblance of its former bio-diversity.



**Figure 2: Unsupervised classification of Nauru**

Source: USGS GLOVIS data portal

Figure 2 is a classified image of the island of Nauru. Using ENVI satellite image processing software, each pixel of the LANDSAT image of Nauru was classified into one 7 categories based off of reflectance values using an iso-means unsupervised classification process. The reflectance value is the level of radiation reflected up to the LANDSAT sensor, and values for multiple bands of radiation are stored in each pixel. The areas in purple are clouds, green



forests, gray urban/developed, black black-top, light brown barren land/sand, dark brown scrubland, and blue is the ocean.

The analysis shows the level of environmental change going on this small tropical island. The scars of the intensive and complete mining of Nauru's phosphates can be seen from space covering over half of the island's surface. This includes the 25% of Nauru that is a completely barren moonscape and 30% scrubland, in the first stages of ecological recovery. The forested lands that used to dominate this landscape now makes up only 11% of the total land area. With developed land, blacktop and urban classes, coming in at 15%, forested area has the smallest spatial footprint. Although this data shows the full scale of the ecological trauma on Nauru, it also shows there could be a glimmer of recovery as well.

### **Desiccation of the Aral Sea**

The Aral Sea is an inland Sea in central Asia along the border of Uzbekistan and Kazakhstan, both former Soviet republics, is the scene of an ecological disaster of an unprecedented scale. As the European powers started to lose their grip over their overseas colonies in the decades following the end of the Second World War, Europe (especially Great Britain's with its loss of India) lost most of their internally control cotton production centers. Seeking to capitalize on this, the Soviet Union expanded irrigation in the Aral Sea basin in order to ramp up cotton production in the region in order to enhance their position within the global market for cotton. Starting in the late 1930's and reaching its peak in the 1960's, the Soviets created a massive network of irrigation canals by diverting water away from the Amu Darya and Syr Darya rivers (Severskiy & Ponomarenko, 2005). The open channel irrigation network was massively inefficient due to evaporation and absorption in the soil, but it over saw a geometric increase of irrigated farm land in Uzbekistan.

Very little thought was given by the Soviet planners of this irrigation network to the fact that these two rivers were the main source of replenishment for the Aral Sea. As irrigated farm land doubled, total flow towards the Aral Sea was cut down to a 1/5 of its previous amount. This diversion of water essentially choked the Aral Sea and caused it to rapidly contract, leaving the Aral-kum dessert in its wake and causing the salt content of the sea to multiply. In the 1980's the sea was split with a series of dams engineered by Kazakhstan. While the Northern Aral Sea has seen a degree of recovery, the Southern Aral Sea has become a hyper-saline water body with a salt content of 100 g/L (United Nations Environmental Programme, 2014). This has permanently crushed the local fishing industry and has produced eerie images of dilapidated fishing boats rusting away in the middle of the desert.



**Figure 3: Abandoned fishing boat rushing away in the Aral-kum desert**

**Source: National Geographic**

The expanding Aral-kum desert presents even greater ecological problem for the region. Decades of agricultural runoff from the cotton farms of Uzbekistan and Tajikistan has produced a toxic layer pesticide and fertilizer along the newly exposed seabed. This has rendered this land completely infertile for farming or livestock. The hypersaline nature of the diminished Aral Sea slowly decimated the fishing industry that had formerly thrived in the region for centuries; displacing the populations who depended on fishing or dependent industries. Tonnage of fish caught in the Aral Sea dropped by over 50% in the twenty years in between 1960 and 1980 before diminishing to zero within the next twenty. The human tragedy of the Aral Sea region has been compounded by the toxic dust storms that send whirring, toxic clouds of sand, salt, and agricultural runoff spiraling towards the Amu Darya river delta region. These dust storms have

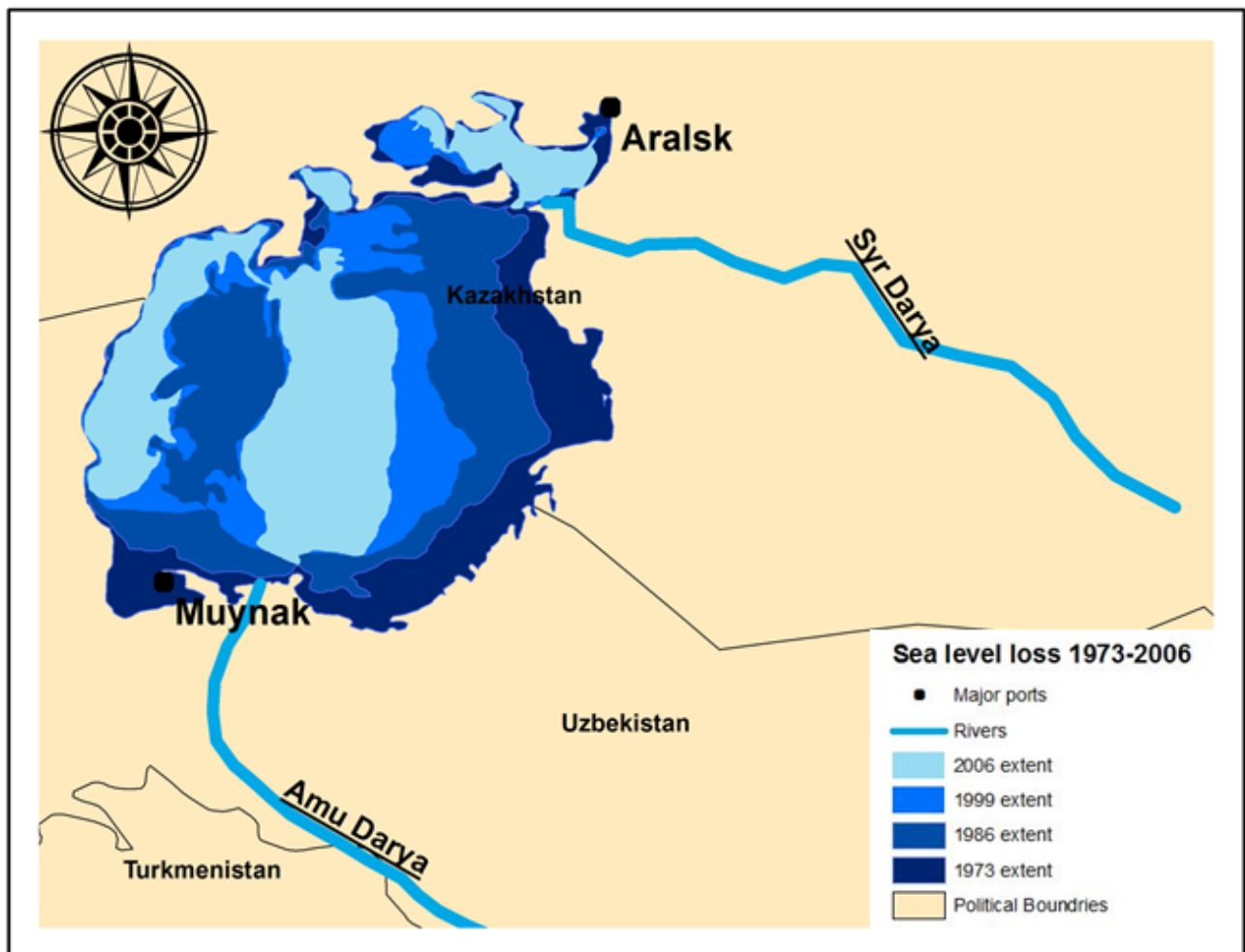


Figure 4: Map detailing the decline of the Aral Sea since 1973

carried 15-75 million tons sand per year in between 2000-2009 and have led to a dramatic rise in Tuberculous and other repertory diseases (Severskiy & Ponomarenko, 2005).

The Aral Sea crisis has had a devastating impact on the biology of the entire region; not only its human inhabitation. The flood plain ecosystems, river delta environments, and the Tegu forest ecosystems have seen a decline in bio-diversity similar to that of the aquatic ecosystem of the Aral Sea itself. None of the endemic fresh water and only a fraction of the brackish fish survived the collapse of the Aral Sea. While there is some hope that the Northern Aral Sea could rebound as an ecosystem, the Southern body appears to be doomed to become a biological desert. The delta regions have seen a 50% reduction in mammal population and a 75% reduction in migratory bird population. Unless a major international effort creates either additional in flow to the sea and or reduces diversion of the Amu Darya and Syr Darya rivers, the negative impacts on this ecosystem will become permanent as a new equilibrium is established.

### **The Spanish Empire in the Andes:**

Negative environmental impacts from resource extraction on this massive a scale can be traced back to the earliest stages of the pre-industrial colonial era to Spanish silver mining. The spine of the South American continent, the Andes Mountains, would become the regional epicenter of Spanish colonial activities. Spanish wars in Europe during the 15<sup>th</sup>-17<sup>th</sup> centuries made the crown highly dependent on South American silver, and would lead to centuries of overseas pressure on colonial administrators to increase silver production regardless of the human or environmental toll (Moore, 2010). Thus the main objective of the Spanish colonial authorities was to keep silver production moving at a steadily rising pace. To keep the well-oiled machine running at full capacity, the mines would need access to three vital commodities; labor, timber, and mercury. To acquire these commodities in the amounts needed for such a massive

undertaking would result in an ecological over draft that would degrade the region, and ultimately hamper the future pursuit of those commodities (Nriagu, 1994).

Spanish silver output would ultimately become dependent on maintaining control over commodity frontiers needed to supply the mines with vital raw materials needed. These frontiers were zones adjacent to areas of economic activity that contain the raw materials needed to continue production of the final product in question. The footprints of these frontiers would grow exponentially during the period of Spanish rule in the region. The prioritization of increased output over supply chain sustainability created an ecological over draft that depleted the local natural resources to a point where it could neither maintain previous levels of production nor meet the increased levels that were being demanded by Madrid (Moore, 2000). This forced Spanish colonial forces to push further into the Amazonian periphery. The increased cost of expanding and maintaining the frontiers would create a positive feedback loop where the aforementioned costs pressured colonial administrators to increase production, causing more ecological overdraft that would create the need for further expansion of the commodity frontiers, and so on, resulting in the incorporation of more territory into the semi-periphery supply zones.

Labor ultimately became the commodity that would require the most amount of effort by the colonial state to maintain. The Amazon River Basin and Andes Mountains regions were sparsely populated, and the high altitude of the mines ruled out slaves from the African coastal plains as a viable labor solution. To mobilize the reluctant local populations into the silver mines, the Spanish authorities created a tax called the mita, which was inspired by the Incan Empire's labor draft system. This increasingly heavy tax burden could either be paid in coin or in a few months of labor to the Spanish authorities. However the brutal conditions under which this tax was paid bore striking resemblances to the slave trade (Moore, 2010). This labor draft was often

used, strategically, to disrupt indigenous agricultural at labor intensive points. Also, this tax encouraged the indigenous population to move onto plantations as a means of avoiding the brutal conditions of the mines. Forced relocations of indigenous people, disruption of irrigation infrastructure, and free range grazing of invasive farm animals were also used to coerce indigenous people into the Spanish commodity-based economy, as opposed to the sustainable practices that had been developed over centuries before the Spanish had arrived (Moore, 2010). As the radiuses of the timber commodity frontier expanded, a vast number of acres of clear cut lands opened up for large scale agriculture on plantations and ranches to support the needs of the mining camps as well as to produce cash crops. This provided both a demand for greater centralized labor and a more areas to concentrate populations on; thus assimilating a greater percentage of the indigenous population into Spanish land-tenure systems.

However these efforts could never be enough because as silver deposits had to be removed from deeper within the mountains (thus the cost of extraction increased) more corners were cut in the department of worker health and safety. These pressures would decrease the life span of the average worker in the mines, compounding the need for more laborers. One of the leading killers of indigenous miners was mercury poisoning while also reduced the fertility of indigenous peoples (Fisher, 1998). These drains on the labor pool meant that populations of thousands of square miles were rapidly centralized around the mining camps and the other industries that supported the mining operation. This massive and systematic centralization of indigenous populations would maximize the impact of European pandemics that plagued the pre-Columbian populations of indigenous people.

Timber was the next limiting factor of silver production. In the pre-industrial period of colonialism, timber was one of the most strategic resources. Forest adjacent to silver mines was

rapidly consumed to fire the furnaces of the silver smelters. After all of the trees in the immediate area were used up, often any combustible flora was consumed as a crude replacement. As silver mining became more labor intensive, the need for timber also increased dramatically (Nriagu, 1994). Timber was needed to build the increasingly larger mining camps to house the indigenous laborers, and to accommodate the Spanish colonial authorities' attempts to centralize indigenous populations. To reach underground deposits, timber was needed to provide structural support for the ever deeper silver deposits. As mining operations grew, the need for supporting agriculture and transportation infrastructure further increased the demand. For every mile the silver mines went underground, the timber extraction frontier can be estimated to have been pushed out between factors of 10 or even possibly even 100 as the support industries for Spanish mining enclaves over took the size of the mining operation itself (Moore, 2010).

Mercury was the final commodity needed for Spanish silver mining on a continental scale. After the main silver veins were stripped from the mountains sides, the remaining deposits needed to have the silver chemically extracted via a process known as the patio. The patio process, a form of mercury amalgamation, became an essential process to extract silver from ores lacking purity. As the quality of ore decreased over decades of massive extraction, this method became the back bone of Spanish silver mining until the end of colonial rule in South America and would maintain its dominance over the silver mining industry for decades after independence. Inefficiencies combined with crude training and technology resulted in massive amounts of mercury being waste by the ton annually. It has been estimated that (based off of the fluctuation price of mercury during the period of Spanish rule) between 1.5 kg and 2.5 kg of mercury could be lost per kg of stamped silver produced (Nriagu, 1994).

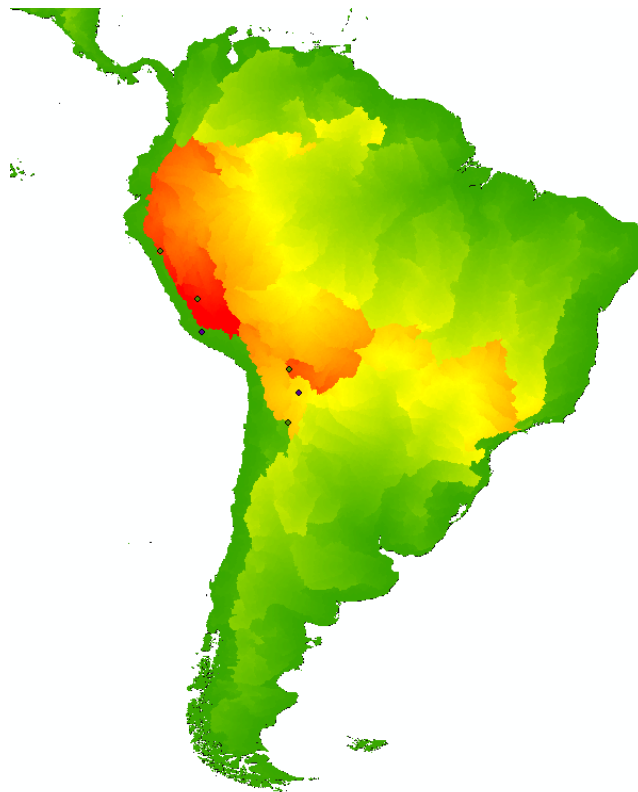
The environmental impacts of Spanish silver mining can be best illustrated by the histories of the Potosi silver mine in modern day Bolivia and the mercury mine of Huancavelica located in current day Peru. By 1570, the mine at Potosi would be one of the driving forces in the explosion of Spanish silver production during the period; producing 48% of the world's silver up until 1600 (Moore, 2010). Fuel to feed the resource intense silver extraction process decimated the adjacent mountain forests of timber and any other combustible flora in order to keep up with skyrocketing production. At its peak in the mid 1700's, the Potosi mining camps had swollen to a population of approximately 160,000 people, a size rivaling many European cities at the time. This need for structural timber was only compounded by demands created by deeper deposits being extracted as well as the maintenance of existing tunnels. Potosi's timber commodity frontier extended for hundreds of miles into timber sources in modern Paraguay, making timber so expensive that it became economical to haul in grasses (as a crude fuel replacement for timber) from up to twenty miles away to meet some fuel demands. As the timber frontier grew at geometric rate, so did the labor demands needed to maintain it. Circa 1600 there were roughly 1.5 miners for every forestry worker. By 1700, 5 laborers were involved in cutting down, trading for, or hauling timber back to Potosi for every 1 laborer extracting silver underground (Nriagu, 1994). This led the 200,000 square mile labor commodity frontier to expand outward to meet these demands.

Huancavelica was the main source of mercury for Potosi silver extraction. Its tunnels acted as Potosi's mercury commodity frontier and would respond to the pressure of meeting its never ending material demand. Similarly to Potosi, by 1650, the supplies of timber and combustible flora had been pushed beyond ecological overdraft into almost total annihilation within an expanding radius of the mine. However, Huancavelica needed a far greater labor pool



than that of Potosi due the toxic work conditions that has been estimated to kill, maimed, and or poisoned well over two thirds of its work force; earning it the nic-name, the mine of death (Moore, 2010).

Compounding the environmental problems posed by Spanish silver mining is the physical geography of these mining operations. Spanish mining activity was concentrated along the Andes Mountains. These mountains are the continental divide for the South American continent, making the region the ultimate source for the majority of the continent's rivers. The environmentally indifferent practices of Spanish silver mining took place in the one region in South America that could have the greatest impact on the hydrology of the Amazon River Basin; thus turning the world's largest fresh water river system into a massive vector for spreading mercury pollution. Ultimately, the Pacific Ocean and the Amazon Basin would serve as mineral



**Figure 5: River length analysis based of South America with Silver and Mercury mines shown as points**

sinks for these increased amounts of mercury being added anthropocentrically to the environment.

This vector's impact would only be multiplied by the erosion brought about by the deforested landscape after the timber commodity frontier and the draft animals used for transportation devoured any flora on the mountain slopes that could possibly mitigate the erosion. The geology of tropical soils is such that leeching would concentrate any mercury along similar mineral horizons as iron and aluminum (Roulet, 1999). With no trace of the previously dense root network remaining, the loose topsoil was rushed away by the high level of tropical precipitation. This in turn exposes the layer of soil acting as a sink of mercury contamination to erosion and eventual sedimentation within the Amazon River system. Although mercury deposition falls off exponentially with distance from the contamination source, the constant rate of contamination over the three centuries of Spanish colonial rule created a significant increase in background mercury contamination within the Western Amazon Basin.

Above is hydrological analysis of the South American continent. Using river data from the World Wildlife Foundation's HYDROSHED's project and GIS mapping software, this image illustrating the average river length of tributaries feeding the Amazon River was produced. Areas in red have the highest average river lengths, and thus have a greater impact on the continent's hydrology as the areas in green with the lowest. This clearly shows that the major Spanish mining operations (shown as green points) were located in areas with the largest possible impact on regional hydrology. The southeast cluster of mines is shown to have a possible hydrological impact deep into the interior of the Brazilian Amazon, while the northwest cluster of mines is located within the area with the highest levels of hydrological impacts.

### **The Relationship in Between Colonial Control and Deforestation:**

Before the industrial period's utilization of coal and later oil as highly efficient fuel sources, the European colonial empires were powered by wood. Charcoal produced the steel weapons and tools that Europeans used to conquer their third world colonies as well as to provide heat for domestic spaces. Structural timber was a vital aspect of building the colonial administration centers and cities needed to run their territories, as well a vital material for building the vital transportation infrastructure (in the pre-Industrial period ships and in the industrial period railroads) need to extend control over colonies. The rapid deforestation within European colonies mirrors the rapid deforestation of the European continent that had been underway for centuries by the start of the pre-industrial colonial period.

Deforestation of colonized lands was a system of colonial control exercised or taken advantage of by colonial powers since the Columbian exchange. The colonial powers of the pre-industrial imperial period sought to shape the environments they encountered into the most profitable and strategic form. This existed in stark contrast to the indigenous societies that had adapted their ways of life to the environment surrounding them. In this context, altering the environment was a statement of political domination by the colonial power. This ecological domination of a territory would pave the way for the political domination of its indigenous peoples, who, left without traditional means of subsistence, had to choose between relocation (to marginal, remote, or otherwise occupied areas) or to accept the new role offered by the colonial society. This role was almost exclusively the role of exploited laborer with limited rights and opportunism.

## American March across the Great Plains

European powers used ecological domination across the globe, but one of the starkest examples of this tactic was the American march across the Great Plains towards the Pacific Ocean during the mid-nineteenth century. The vast territory claimed in the 1803 Louisiana Purchase and compounded by the territory won in the Mexican American war, of 1846-1848, was promoted to be a blank slate of prosperity by the American government to promote national healing after the traumatic Civil War. This policy of Manifest Destiny and the completion of a trans-continental rail trunk line in 1869, sent waves of American settlers west into this 'empty wilderness'.

Only it was not empty by any stretch of the imagination. American expansion, first over the Appalachian Mountains and then across the Mississippi river, was preceded by a wave of displaced tribes. The desire to have indigenous tribes relocated west was fueled by French and English attempts at indirect rule over North America. Starting with the Seven Years War (1754-1763) the French enlisted Native Americans as proxies against the British in the Ohio River valley and Appalachian mountain regions. This sense of conflict between British colonists, who later became American settlers, and Native Americans was compounded by the American Revolution and the War of 1812 where the British government borrowed the French tactic of enlisting native as proxies in their fight against the Americans. These conflicts brought about brutal raids on civilian settlements by both sides. The most notorious act of Native American relocation, the Cherokee Trail of Tears, was encouraged by the fact that the Cherokee had sided with the British during the American Revolution.

From the period following the end of the American Civil War and the beginning of the 20th century, American settlers drove east from the Californian coast and west across the

Mississippi River; squeezing indigenous tribes off the vast majority of their land and destroying their way of life. Justifying this land theft via the almost constant violation of treaties, ethnocide, and occasionally attempted genocide was the notion “Manifest Destiny” that claimed the American nation was destined to span from the Atlantic to the Pacific. America had a two pronged strategy to achieve its “Manifest Destiny”. First, Native American tribes would be made to become tied into the wider economy by undermining of their traditional means of subsistence (in a very similar manner to the Spanish in South America three hundred years earlier). Second, by demonstrating the superiority of the western land tenure model and global capitalism would be established with ecological domination in order to force hold-outs to give-in or starve.

The American settlers of the west and the American government had a vested interest in imposing the American cultural-landscape in order to marginalize or displace indigenous peoples of the American west. By this logic, ecological domination of the was not only a source of economic resources, but living up to the cultural expectations of Manifest Destiny as well as justifying the displacement of the indigenous people. This resulting ecological domination became engrained in the culture of these new settlements that spread across what would become the Western United States

The buffalo of the Great Plains would bear the brunt of this American push to dominate the plains west of the Mississippi River. At first buffalo populations sagged as American settlers started hunting these animals as a means, as their Native American counter-parts had done for centuries. However, a combination of increased Native American resistance to relocation (highlighted by the American defeat at Little Big Horn) and a commercial demand for buffalo

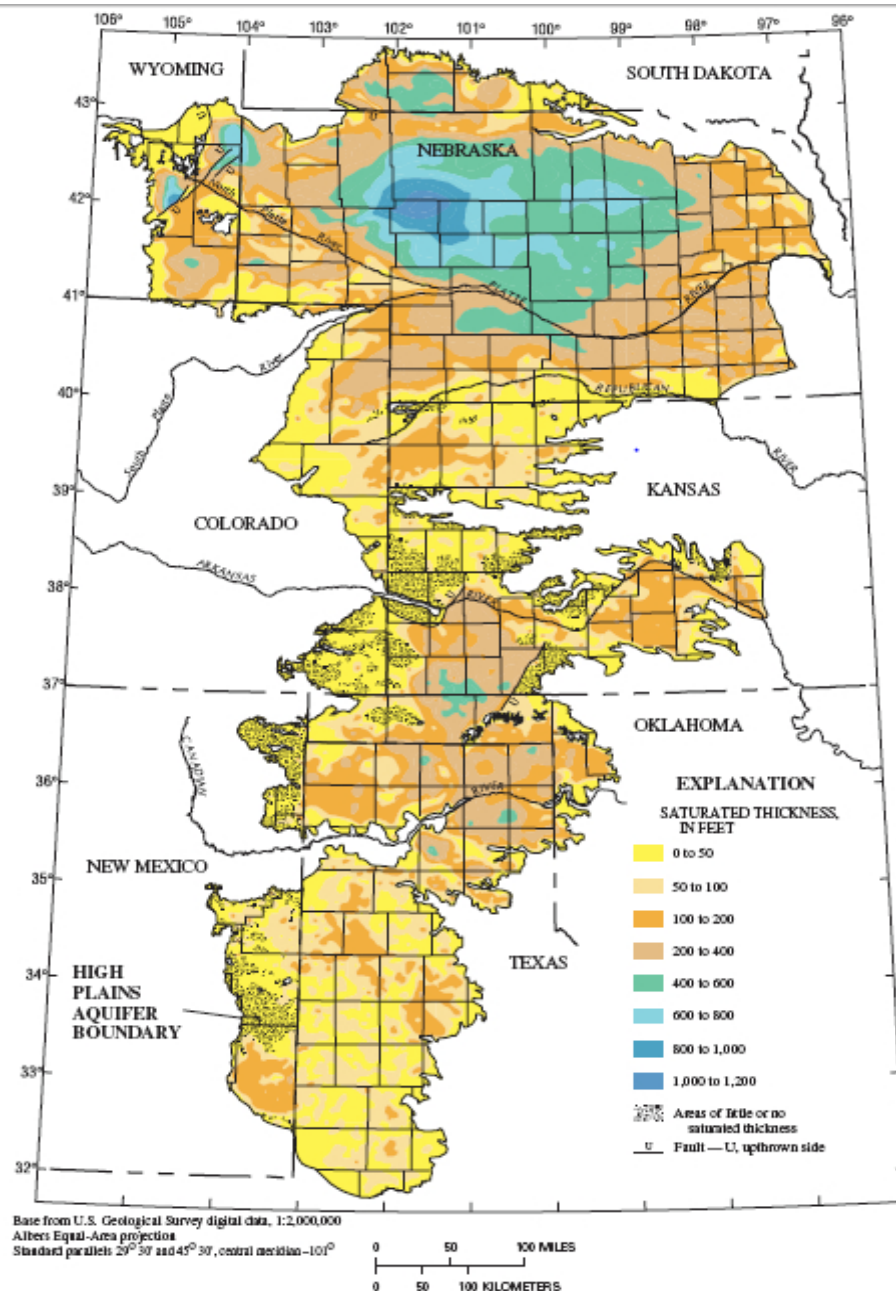


Figure 6: States on top of Ogallala aquifer

Source: National Atlas

leather kick-started a campaign to exterminate the species in the last half. Buffalo herds across the west that were estimated to contain over 60 million individuals at their peak, were reduced to less 1,000 individuals by 1900 (Coates, 2004). The buffalo were the corner stone of Native American survival; using the animal for everything from food to shelter.

Without massive herds of buffalo roaming the plains of the American west, Native American tribes had little choice but to relocate, making room for an exponential expansion of American agriculture in the region. In an expression of ecological domination, American farms and ranches expanded well beyond the water resources of annual precipitation; depending on groundwater for 81% of irrigation water. This groundwater comes from the Ogallala aquifer (shown on the page above), and has been depleted at an alarming for well over a century. The Ogallala aquifer was created roughly 1.8 million years ago; the result of a 20 million year process. Withdrawal rates in 2012 were estimated at over twice the replenishment rate (MIT, 2012). With the widespread development of hydraulic fracturing on the northern and southern fringes of the aquifer, the issues of depletion will only be compounded. The notion of total ecological domination that fueled “Manifest Destiny” could leave this conquered territory a desert waste-land within 100 years at the going rate.

### **Madagascar and the Ecological cost of Displacement:**

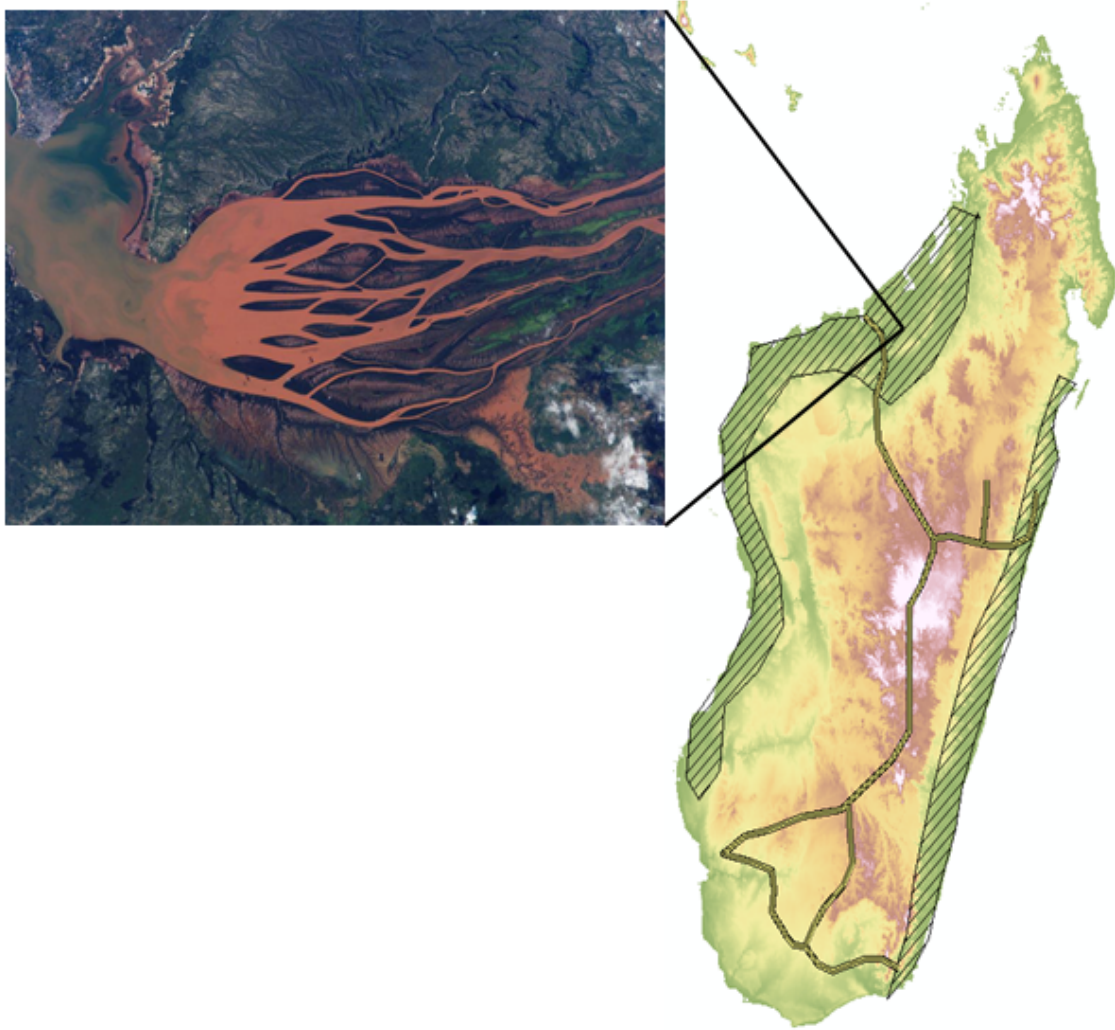
As France’s control of Madagascar expanded in 1896, coffee and other plantations started to consume most of the ideal land. Coffee plantations started producing significant tonnage of coffee by 1930 and would produce in between 30-50 thousands of metric tons a year for France, until the colony’s independence in 1960 (Mitchel, 2003). This was done not only done as a means profitably supplying growing global demand of coffee, but as a means of converting the population to living off wages rather than traditional alternative: slash and burn rice farming.

The colonial strategy would create a sedentary population that was tied down to the land, and it would enable the French colonial administrators to tax and control the populous. Under French administration labor drafts took the form of crudely disguised slavery that often targeted boys as young as 15 years old (Sharp, 2003).

Resistance to this dependence on wages for picking cash crops (and thus dependence on the global economy) drove many indigenous people reject this notion and to continue the traditional shifting cultivation in more marginal highland regions of the island. This echoes the concept of Zomia in the central Asian highlands that formed as a result of rise of the oppressive states forming on the Indian subcontinent, China, and Southeast Asia. The natives of Madagascar, like the anti-statist people of central Asia, turned to altitude and geographic remoteness to blunt the advance of the state's influence; as neither the French colonial administration nor the early south East Asian kingdoms lacked the resources to impose their will into the marginal hinterlands.

The French in Madagascar banned the practice of shifting agriculture under the legitimate pretext of forestry conservation. From that point on, shifting cultivation gained the pretext as an act of independence from colonial control among the native people of the island. This combined with decades of lack of social mobility on the plantations greatly encouraged the practice as a practical resistance to the particularly brutal French regime (Jarosz, 1993). In the mountains and hills where the resistance was practiced, French rule was a political shadow cast by the presence of administrators or armed forces. Without their physical presence there were little to no tangible signs of French sovereignty over the territory.





**Figure 7: Deforestation and colonial control on Madagascar**

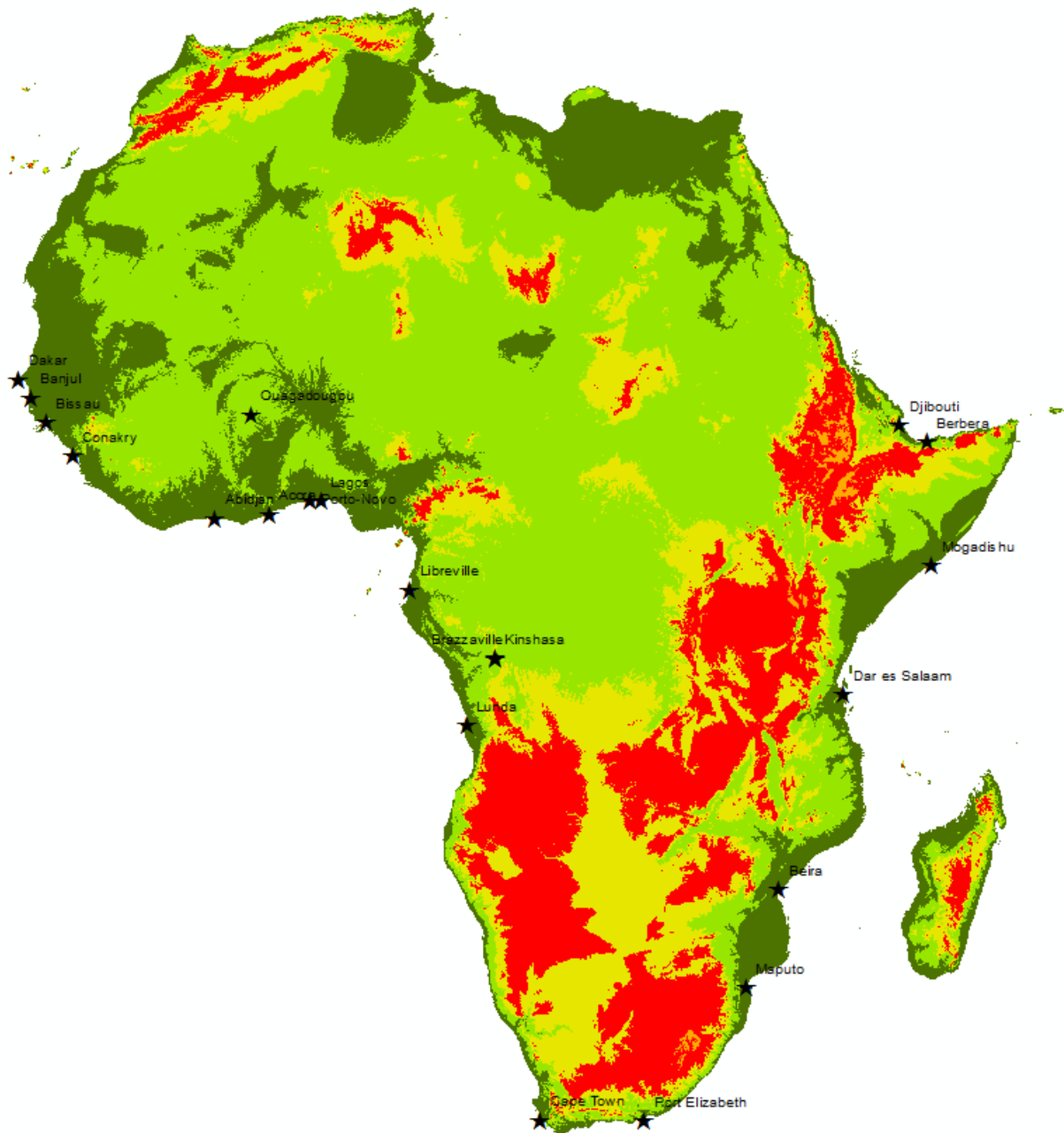
The main ecological concern with a Zomian style insurgent state in the highlands of Madagascar was the slash and burn technique utilized by the shifting rice cultivators. These marginal highlands were (and still are today) at greater risk of deforestation, massive amounts of erosion, slope failure, and other forms of environmental degradation than fertile low-lands that were being utilized as plantations. The human displacement caused by large-scale cash-crop agriculture in colonial Madagascar forced shifting cultivators onto the marginal highlands, where these methods would prove ecologically un-sustainable (Randrianarijaona).

Figure 9 is a Digital Elevation Model of Madagascar with an insert of true color LANDSAT image of the Betsiboka River. The crosshatched areas on the northeast and western coasts were the areas with the largest presence of colonial plantations. In the areas shaded yellow, red, and white within the northern and central highlands is where this Zomian insurgent state was most active. The presence of transportation lines running through the interior of island from their coastal bases of power (shown in green), allowed the French to cast a much longer shadow of power. However, the fluid nature of an insurgent state meant that the slash-and-burn farmers would only be displaced further into the wilderness. The LANDSAT image shows the stunning blood red river tone caused by the high levels of clay and soil in the water. The levels of deforestation on the marginal, steep slope areas result in decreased root density and increased amount of soil being washed away down-hill.

#### **Transition into the Industrial Period:**

The 19<sup>th</sup> century would prove to be a transitional period during which the Mercantilist powers of the Pre-Industrial period would absorb and or be eclipsed by the Industrial Capitalist powers that would dominate the global economic core until the end of the colonial empires. The transportation and communication transformations brought about a rapid expansion of colonial territorial control within the interior of Africa and Asia. In regards to resource extraction, the transition into the industrial period would result in empire and industry creating a positive feedback loop that would establish these industrialized empires within the epicenter of the global economic core. As the core powers of European and America industrialized, their demand for raw materials and new markets to sell finished goods increased dramatically. This resulted in further territorial expansion at the expense of the “periphery” territories in order to maintain control over (and thus maximum profitability of) the periphery markets and raw materials.

This period is marked by the independence of Europe's colonies in North and South America and the decline of the Spanish Empire. Spain's decline from the global core coincided with the emergence of the United States from the periphery into the global core. The United States' ascension into Spain's position in the global core was completed by the end of the 19<sup>th</sup> century with the Spanish-American War that oversaw the last remnants of the Spanish Empire handed over to the Americans. The emancipation of the Western Hemisphere transformed the patterns of European control in Africa. The pre-industrial period empires sought very little direct control of African or Asian territory; limiting European presence to a series of trading posts/forts running along the coast. The massive scale of pre-industrial colonization in the western hemisphere was a direct result of European diseases wiping out any geo-political obstacles to direct rule in North and South America. Africa, during this period, was mainly exploited for slaves to be used to develop the European colonies in the New World. The absence of these lucrative colonial possessions causes the imperial powers of the Industrial period shifted focus towards expanding their power beyond their coastal footholds as a possible economic replacement.



**Figure 8: DEM of African Continent and coastal capitals**

The map above is a Digital Elevation Model of the African continent classifying it into four general zones. The dark green zone (under 350 feet above sea level) are the down river and coastal zones. These areas were ideal power bases of the early European footholds because of its general proximity to the sea to allow easy trade, resupply for fortified areas, and reinforcement

of garrisons. This down river zone also contains the major African river deltas and the mouths of Africa's navigable rivers. Fertile river deltas increased the level of profit that could be extracted from the colony in the form of cash crop production. The drainage points located with the downriver zone provided European colonizers with a means of leveraging their naval power further inland and establishing these rivers as a transportation network. This region would develop into the core of colonial controlled Africa.

The light green zone on this DEM is the upriver zone (350-1000 feet above sea level). In the pre industrial period, this zone represented an area of European influence; where the explorers, missionaries, and traders of the European powers made first contact inland. Before the Industrial period technology paved the way for full scale control of Africa, European powers were able to expand its influence and territory. It was here, where the Atlantic slave trade was fueled by the exchange of captives taken from further inland for guns. However, natural barriers such as deserts and dense tropical rainforests would hamper the colonial powers' attempts at establishing political and economic control further inland; either directly through force or indirectly through trade. This zone represents the semi-periphery of the colonial world

The red and yellow areas represent the highland and mountainous areas of Africa. These zones would prove to be the most difficult of all to bring under European control. Most of these areas remained elusive to European powers until the technological advancements of the industrial period would annihilate the temporal-spatial obstacles posed by the African interior. One of the only two independent African states of the early 20<sup>th</sup> century, the Abyssinian Empire, was located within these zones. This kingdom would use its geography as an impenetrable fortress until it was conquered by an Italian army in 1936 with air power and mechanized infantry.

These technologies also brought about two of the most important engineering projects of human history that would open up India and Asia to European powers; the Suez and Panama Canals. The completion of the Suez Canal in 1869 drastically shrank the size of the “old world” and ushered in the dominance of steam power in global shipping. This would effectively reduce the distance from Europe to India by half; enabling the cost effective transition from the Pre-Industrial period trading post empires towards the territorially consolidated empires of the Industrial period in East Africa and Asia (Fletcher, 1958). The Panama Canal would have a similar effect on the western hemisphere upon its completion in the early 20<sup>th</sup> century.

This expansion of European control in Asia during the first and second Kondratieff cycles reflects the different objectives European powers had in Asia as opposed to Africa. The early colonial enterprises in Africa during the pre-industrial period were often established to provide bases to reach Asia, in order to bypass the overland trade routes controlled by the Ottoman Empire. The ultimate goal of European powers was to insert themselves at the top of the Indian Ocean trade network that had existed for centuries (economically connecting East Africa all the way to China) and gain access to luxury commodities, especially spices, to sell back in Europe. As the Dutch and British successfully inserted themselves at apex of this network, they began to acquire territorial buffers as colonial powers did in Africa. However, the sheer distances involved with maintaining control of territory on the opposite side of planet would ultimately contribute to the early demise of these colonies compared to their African counterparts.

## **Environmental Impacts of Colonial Legacies**

The global imperial powers have left an enduring mark on the development of their former colonies. These colonial legacies take political, economic, social, as well as geographic

forms and have often undermined the post-colonial state. These legacies have negatively contributed to the environmental health of many former colonies. Although a myriad of forces have shaped former colonies, the open ended nature of these colonial empires coupled with a general lack of consideration for long term consequences of colonial policies makes these damages attributable to global imperialism; even though these events would transpire after the colonial power gave up formal control of the polity.

### **Experience-Distant States**

One of the lasting impacts of the colonial empires of the past few centuries is the total insertion of Westphalia geo-politics across the planet. This would in turn start a frantic race among the colonial powers of the pre-industrial and post-industrial eras to fill in the blank spaces on the map. The ensuing centuries-long geo-political chess match would result in rival empires wriggling their way into every corner of the globe with the hopes of gaining territorial leverage over their rivals. By the dawn of the first world war, maps were running out of apolitical (in the sense of not being involved in the international politics of global imperialism) space as the sprint to establish colonial holdings in the Africa, Asia, and the Pacific had morphed into a geopolitical contest to establish the largest spheres of influence between the United States and the European colonial powers of France, Great Britain, Portugal, Belgium, Germany, Italy, and (to a much lesser extent) Spain.

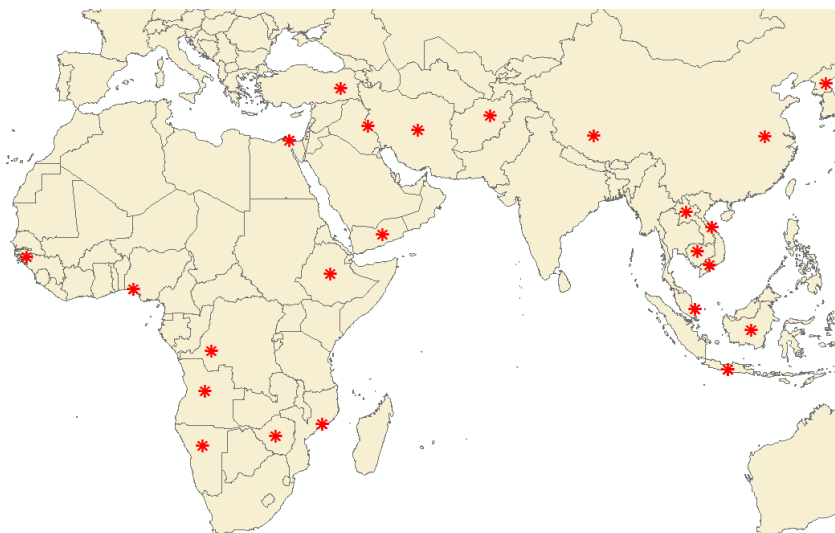
Political control over space did not simply span around the globe, but extended deep into the Earth's crust as resources became politicized on a global scale. As European core nations imposed their will on a greater amount of territory, they also imposed the Westphalian philosophy of national sovereignty and of nation states based off of international treaties. The Westphalian philosophy, established at the end of the 30 Years War, was Euro-centric and was

built off of the European-style nation state. Imposing this on societies in Africa and Asia (especially remote and rural areas) represented a rapid departure from traditional spatial distribution of power. Pre-industrial colonies clustered around oceanic and river transportation networks as well as natural resources determined to be profitable for the colonizing power. However, as the industrial period saw the spatial expansion of European control increase exponentially, the direct rule over spheres of influence became necessary for the maintenance of a profitable status quo within the regions of strategic value, creating islands of development. Now massive swathes of territory were being taken over to create buffers around natural resources and transportation infrastructure, conquering land simply to use it as a shield against rivals in the region. These peripheral territories, mostly dense rainforests and deserts, became areas of low sovereignty and received minimal development. These boundaries of colonial administration mashed together coastal, up-river, down-river, and highland territories in a very arbitrary manner.

At the dawn of the 20th century, the core powers of France, Russia, England, Germany, Belgium, and Portugal had centralized power around the globe to a degree that had never been seen before in human history, and might never be seen again. These empires had pushed against each other like tectonic plates, until the cataclysmic event of World War 1 and the aftershock of World War II brought about the post-colonial period. The United States of America and the Soviet Union moved further into the global core, and the Cold War (a period where a tiny slip along a geo-political fault-line could have caused a nuclear political aftershock) became the high tension backdrop of the de-colonial process. Both of these powers grew to inherit the idea of neutral political space as a vacuum that could be exploited by their adversaries at their own expense.



During the post-colonial period of the second half of the 20th century, the world saw new nations rising out of colonial structures based off of export economics and divide and rule politics. In Africa, the Middle East, and in Central Asia (following the break-up of the Soviet Union) these newly independent states were essentially hollow political structures that existed far from the cultural experiences and political identities of its citizens and thus existed at the mercy of centrifugal forces. Many of these former colonies would come together to forge a national identity and would become functioning nation states that would become a part of their citizens' cultural identity. However, many former colonial nations (or regions within former colonial nations) could not create this identity, and thus became experience distant nations that existed on maps more than on the ground; with border that were no less arbitrary than the borders of its colonial predecessor. Examples of experience-distant states are Afghanistan, Somalia, South Vietnam, and Central African Republic, Sudan, and the former Yugoslavia Republic. The divide and rule tactics that proved immensely effective for western powers to rule large territories from a small power base, turned these new experience distant states into platforms for these factions to establish political and economic power over their rivals. This paved the way for dictators to establish an iron grip over these nations, by simply placing themselves with in the power vacuum



at the top of the established colonial hierarchy.

This form of governance proved to be a breeding ground for civil war, corruption, and weak extension of sovereignty over its territory. These governments often have very little mandate to rule outside of violence and economic cronyism. As these post-colonial strongmen maintained their power by repressing dissent with a vast array of human rights violations, they found themselves prisoners of power; seeking to maintain their absolute control out of fear of retribution over their previous abuses. This furthered the cultural distance and disillusionment between the people and the state, and thus increasing the political centrifugal forces undermining the state as a political unit. A state in such a condition has to focus a significant portion of its severely limited resources on establishing/maintaining its authority over its own borders and quelling dissent; taking capital away from infrastructure development and social services. A government focused on maintaining its own power is far less likely to devote resources towards environmental management/ regulation, stopping poaching, illegal forestry, and illegal mining as well as manage transnational environmental resources such watersheds and river basins.

Compounding the instability produced by the de-colonialization process faced by a nation with arbitrarily drawn borders, was the polarizing back drop of the Cold War between the United States and the Soviet Union. The end of the Second World War resulted in an uneasy balance of power of the western capitalist NATO (North Atlantic Treaty Organization) powers and the communist powers lead by the Soviet Union. Both sides, in a geo-political chess match akin to the scramble of Africa of the late 19th century, sought to expand their influence at the expense of their rival as a form of deterrence against a third global conflict; a nuclear conflict that would loom over humanity for almost 50 years. The patterns of indirect rule and ethnic divisions built into many experience distant states following an often rapid de-colonialization process, created

opportunities for the capitalist and communist powers to leverage a sympathetic political order into power by either backing a factional government or rebels opposed to the factional government.

### Overall Environmental Legacies of Experience Distant States

Although experience distant states are exist in a broad spectrum of social, political, and cultural differences, they share many key post-colonial experiences. Sadly, the common dominator among all post-colonial societies (especially with the experience distant nations) is poverty and instability. Despite the paternalistic justifications conjured up by the colonial mindset, colonial powers developed their nations off of a surplus extracted at the expense of the people of Africa, Asia, Latin, and South America; adversely impacting the standard of living for billions of people to this day. These factors combine to compound each other, as well as have a negative impact on the condition of regional environmental systems, and (in a cruel feedback loop) the degraded environmental systems can then coonhound the issues of war and poverty.

**Table 3: The relationship in between poverty and colonial control**

**Data Source World Bank and (Ziltener & Kunzler, 2013)**

Name	%	years of colonial control
Madagascar	81.76	104
DRC	77.18	81
Uzbekistan	66.79	115
Guinea-Bissau	67.08	358
Liberia	68.64	155*
Burundi	77.65	65
Malawi	70.91	79
Mozambique	68.74	470
C.A.R	66.27	70
*informal settler imperialsim		

The people of experience distant countries experience some of the most intense poverty on the planet. According to World Bank statics, there are over 900 million people making less than \$1.90 a day the majority of which are concentrated in the sub-Saharan Africa and in the

former Soviet Republics. Table 3 shows the ten nations with the highest percentage of population under this World Bank poverty line, with a comparison to their colonial and post-colonial history. Colonial powers offered very few economic opportunities for its colonists outside of basic labor, or low-level military positions as more lucrative positions were saved for ex-pats or members of the colonial elite; the same was most often the same in cases of educational and leadership opportunities. This crushing poverty of a daily income of less than \$2 a day adversely impacts its environment as well as encourages the other environmentally damaging legacies of experience distant states. At this level of income, only the basic levels of shelter are economically feasible; without any water or gas connections. This can lead to increased levels of air and wastewater pollution. Poverty has links to deforestation through increased reliance on timber for as a fuel source. Increased levels on environmental degradation impacts the rural poor the hardest who depend the environment to obtain subsistence (Binns, Dixon, & Etienne, 2012). Also, poverty plays a key role in corruption and armed conflict. Extreme poverty can encourage people to join an armed conflict because they have very little to lose by doing so and it might be one of the only economic opportunities available (Debos, 2008).

Wars in general, directly damage the environment through the detonation of explosive ordnance, creation of war-time infrastructure, and the rapid movements of thousands of people often in densely vegetated areas. Over the course of protracted conflicts, belligerents often turn toward illegal resource extraction as source of income, because conflicts often increase opportunities to smuggle plundered resources on to the domestic market. The illegal operations are often open pit mines that cause increase erosion as well as these operations' unregulated use and disposal of chemicals during the extraction process (Flint & Taylor, 2011). In extreme scenarios, a counter insurgency force could destroy forest eco-systems (either mechanically clear

cutting or chemically with the use of defoliants) in order to crack down on the movement of insurgents through densely forested, low-sovereignty areas. The most infamous case of this was the United States chemically defoliating the countryside of Vietnam with the highly toxic chemical, agent-orange. Armed conflict undermines local systems of sustainability by removing the labor force needed to maintain these systems while also restricting the area of land able to be used; thus eliminating traditional policies of rotating agricultural lands to maintain fertility.

The greatest level of ecological damage from wars is the results of civilians attempting to flee the impacts of these conflicts, and the process of rebuilding afterward. Refugees and internally displaced people are often forced exploit natural resources in order to survive in absence of any formal infrastructure. Poaching can skyrocket in and around conflict zones as people turn to bush meat as a major food source (Binns, Dixon, & Etienne, 2012). These people are often fleeing with little to no supply or money are thrown into absolute poverty and concentrated into often underfunded refugee camps. The same environmental risk factors caused by poverty are then in play, but on a much greater scale because of the massive amount of people involved. Large displaced populations are prone to joining into conflicts due the extreme lack of economic opportunities available to them while they are refugees.

### **Nigeria and Angola: Two Nations Under Shell**

Governments of experience distant states battle the massive centrifugal forces that plague the de-colonialization process because the outside power that formed these oversimplified polities has been removed. The influence of international non-state actors can play a critical role in the new balance of power. International corporations with influence, capital, and cash have historically leveraged these resources to either maintain a version of the economic status quo afforded to them by the former colonial government or to establish a favorable balance of power.

Either of these ends includes pursuing a government less inclined to enforce strict labor and environmental regulation to ensure greater profits. The balance of power in between an international corporation and a newly independent state often leans in favor of the corporation because of the export orientated economies of former colonies combined with the massive amount of resources at the disposal of the multi-national corporation. One of the most notorious corporate powers in experience distant states is the Royal Dutch Shell Corporation.

### Nigeria

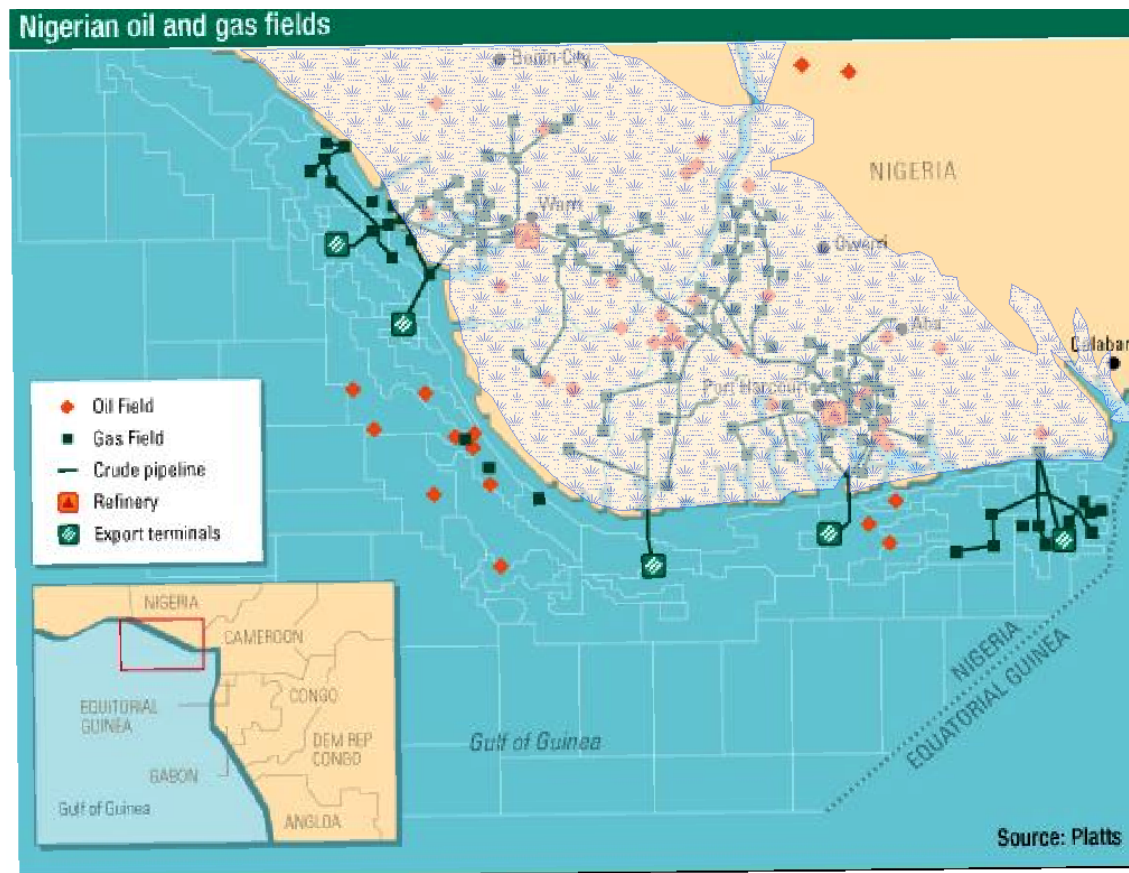
The story of Nigeria and Shell begins at the very twilight of British rule of this West African nation. In 1956 oil is discovered on the Niger River delta. Containing over 2,300 square kilometers of mangrove swamp, the Niger River Delta is largest wetland ecosystem on the continent (Kadafa, 2012). This fragile ecosystem and the millions of people, who inhabit it, had the grave misfortune of living on top of one of the world's largest oil deposits.

This discovery would fundamentally alter the functionality of the Nigerian state; both economically and politically. Oil revenues from taxes off of companies like Royal Dutch Shell company (which holds the vast majority the delta oil fields) would make up the lion's share of the Federal government's income; reaching 90% at its peak in the 1980's Following the civil war of 1967-1970 the central government gained significant authority that it would use to the benefit of its financial benefactors in the oil industry (Frynas, 2001). The Land Use Act of 1978 granted the Federal government the power to allocate any land for petroleum infrastructure projects and limited the liability of oil companies. This legislation, and similar subsequent legislation, worked to cement Shell into the Nigerian economy by prompting greater infrastructure development.

The Royal Dutch Shell company was founded in 1907 with the merger of the Royal Dutch Petroleum Company and the Shell transportation company. The company was a jointly operated

by Dutch and British nationals and be geo-politically supported by both parent nations. The company would establish itself as one of the main oil companies on the global market by the end of the Second World War. By the time of Nigerian Independence in 1960, the Dutch Royal Shell Company was one of the most powerful corporations (both economically and politically) in the world, and was firmly established on three continents (Sluyterman, 2010).

The delta would become home to 159 oil fields with 1,400 individual oil wells supported with dozens of pipelines, crisscrossing hundreds of miles. To date it is widely estimated that up to 1.5 million tons of oil have been released into the environment, making the Niger River delta one of the most oil polluted place on the planet. Oil spills related to sabotage and flaring constant flaring of natural gas has negatively impacted air and water quality (Kadafa, 2012). Acid rain and rampant water pollution has been decimating to local flora and fauna across the region, and has been absolutely devastating to the subsistence of the indigenous people. As this map below displays, the vast majority of the onshore oil and natural gas operations are located within the Niger River Delta wetlands.



**Figure 10: Niger Delta swamps overlaid over Nigerian oil infrastructure**

**Data Source Platts and RIVCHO**

The people of the Niger Delta, while dealing with the entirety of the consequences resulting from the \$500 billion dollars of oil extracted, have seen a very small portion of that money come back to them in terms of infrastructure development and compensation for environmental damages (Obi, 2008). This is due to the close relationship between the Nigerian government and the transnational oil corporations. There is a revolving door in between Shell and the Nigerian that resulted in the high level of collaboration. This collaboration continued during the 1990's when the indigenous populations of the delta region began protesting against lack of compensation and the decline environmental conditions of their homelands. Shell and other trans-national corporations would make payments to the special police detachments that



would use violence against person and property in order to quell environmental protests. These forces would be responsible for the Umuechen massacre that cost 80 people their lives (Enneking, 2004). Shell also attempted to circumvent an arms embargo on Nigeria after the 1995 execution of an environmental and human rights activist.

The issues of environmental damage would only be complicated by the recent turn of Niger Delta activists towards violent resistance after peaceful protests were frequently met with violence and harassment from the government. Some of these groups, like MEND, launched a campaign of offensives against transnational oil company property and kidnappings. MEND has recently stepped up its attacks with car bombings of the Nigerian capital of Abuja in 2010. Another tactic used by armed groups in the region is a process called bunkering of pipelines (Obi, 2008). This process involves tapping into oil pipelines, syphoning off a portion, and sending it to black market refineries to sell the gasoline throughout West Africa at below market prices. However this process is not a science and can result in even more oil spills.

#### **Angola: the issue of Cabinda**

Angola is just behind Nigeria as one of the top crude oil producers in Sub-Saharan Africa. Large portion of this nation's oil wealth come from the waters offshore of its northern exclave Cabinda. This external territory of Angola has an area of roughly 2,800 square miles and shares no land connection with the rest of Angola. Cabinda was incorporated into Angola under Portuguese rule. As a result of geo-political haggling as Europe divided the region, Cabinda would be separated from the rest of the Portuguese territory in south western Africa as the northern bank of the Congo River would go to the French and the Southern bank would go to the Belgians (Martin, 1977). Culturally and linguistically the people of Cabinda have more in common with the Congolese people than the Angolans.

The long standing civil war in Angola made independence of Cabinda a complete non-starter for the Angolan center government. Oil revenues coming from Cabindan waters provided a critical 40% of government revenues needed for the war effort; producing \$2.2 billion worth of crude oil by 1997. The importance of the Cabindan oil money was compounded by the fact that this was the only major industry in Angola that was affected by the ongoing conflict (Martin, 1977). Cabindan independence During the Angolan civil war could have led to the complete collapse of the central government as forces in Luanda would be too busy running a war to patch a 40% hole in their budget

This post-colonial power arrangement that the Cabindan people have been forced into has been a disaster to its people and its territory. A separatist movement in Cabinda fought a 32 year self-determination conflict that was undermined by internal divisions within itself and the vital importance its oil was to the Angolan government (Dos Santos). The Angola army launched a decades long counter-insurgency that would be ramped up after the greater civil war on the Angolan main land, would feature rampant abuse of civilians, and would ultimately cost 30,000 Cabindan's their lives. Major oil spills in the late 20<sup>th</sup> century offshore has done major damage to the fisheries that most Cabindan households depend on for substance (Shantz).

Both of these situations clearly illustrate the dynamics in between a newly independent state and a well-established trans-national corporation. The central governments of Angola and Nigeria quickly became dependent on their relationship with oil companies because of the critical portion of their budgets that depended on the money coming in from the oil industry. This made Shell and other oil companies another core constituency that need to be taken care of; further complicating the tenuous process of establishing a stable post-colonial balance of power within the state. During the first decades after independence were firmly in favor of the oil

companies as they had the option to cut their losses and walk away from these nations. This alliance between the Angolan and Nigerian governments with transnational corporations, would protract the centrifugal forces within the new nation (as people debate the fine line in between collaboration and collusion) and this deepen their dependency on these transnational oil companies. This power balance would shift away from the oil corporations as more infrastructure was developed (thus lowering the risk of corporations walking away from billion dollar investments), but the persistence of centrifugal forces resisting the colonially consolidated nation-states still drives the petro-dollar dependency. The current Boko Haram insurgency in north of Nigeria is a vivid example of how these forces are still geo-political realities that will influence post-colonial nations into the future.

### **DeBeers, Firestone, and Charles Taylor**

West Africa is one of the most ethnically diverse and heavily populated regions of Earth. Unfortunately its geography made it a vital stepping stone for European powers attempting to build-up a presence in southern Africa and in the Indian Ocean. The West African coast would become the most divided piece of the “African cake” by the Berlin conference of 1885. The end of the 1980’s marked the decline of the post-colonial strongmen in Liberia and Sierra Leone. Stepping into this power vacuum, would be Charles Taylor; unleashing a wave of brutality that ripped through these two nations starting in the 1990’s and ending in the early 2000’s. This wave was indirectly sponsored by two international seeking to preserve their colonial era economic agreement in place. The military conflicts that took place in Liberia and Sierra Leone would be defined by images conflict diamonds, child soldiers, and dismembered civilians as well as producing the first conviction of head of state on charges of war crimes.

Liberia is often denoted as one of the few countries in Africa not to fall under colonial rule during the scramble for Africa. However, the freed American slaves that would found this country would establish themselves as ruling elites. These Libero-Americans would rule over the peoples of the interior and extract raw materials for the global market in a manner that mirrors many other colonial states (Marchuk, 2009). This new nation's strongest ally would become the United States of America. All of these factors combined with the back-drop of growing American global presence suggest that Liberia was more of a quasi-American colony than an independent nation.

The hall-mark of the quasi-colonial period was the establishment of the Firestone rubber plantations in 1926. Firestone would establish a 220 acre rubber plantation that it would lease from the Liberian government for \$0.06 an acre. This plantation would at one point supply 40% of the world's rubber and become the largest employer in the country (Cohen & O'Boyle, 2014). The government would become dependent on the tax revenues received from Firestone, and would often call in taxes on future revenues in time of crisis.

133 year of Libero-American rule was shattered in 1980 as Master Sargent Sam Doe lead a coup against the government. The president was assassinated, his cabinet was executed, and for the first time in its history a member of the interior tribes was running the country. The government was filled along ethnic lines, and Doe would rule the country with an iron fist until his death in 1990. He would be killed during the first Liberian civil war by forces loyal to a former minister named Charles Taylor. The conflict would continue until Charles Taylor's election as President of Liberia in 1994 and cost over 100,000 Liberian lives (Marchuk, 2009).

Following the death of President Doe in 1990, Charles Taylor's forces took over the majority of the country with the expectation of an enclave around the capital city controlled by the internationally recognized government. Within the Taylor controlled territory was the Firestone rubber plantation. A vital asset to the corporation, Firestone felt it could not afford to wait out the duration of the civil war and risk the future of the plantation. Court documents and U.S. State Department cables show that Firestone officially began doing business with the Taylor government beginning in 1992. This included making 2.3 million dollars in tax payments and sending all materials through a port under Charles Taylor control (Cohen & O'Boyle, 2014).

This gave Taylor the time to consolidate his power and would lead up to his election as president in 1994. Seeking to expand his power and influence within the region, Taylor provided material support and refuge to the Revolutionary United Front, fighting to take control in Sierra Leone. Despite the group's sacking of the capital of Freetown, the RUF would never take control of whole nation, but would again an inhumane reputation as they unleashed a torrent of brutality on the civilians of Sierra Leone. From their bases in western Sierra Leone and eastern Liberia, would control the diamond fields in this part of the region. Using local civilians as slaves, the RUF would smuggle unknown millions of dollars of worth of diamonds through neighboring countries. These diamond sales would fund Charles Taylor and the RUF until this alliance would be defeated in the second Liberian Civil War; ultimately ending with Charles Taylor's conviction of war crimes in Sierra Leone (Marchuk, 2009).

The colonial diamond cartel DeBeers would end up with the majority of the stones coming from Sierra Leone until the Kimberly Process was adapted. DeBeers had maintained a strangle hold on the global diamond industry for centuries; keeping an iron fist around the global supply of diamonds. The changes in the geo-political landscape in the 1990's made DeBeers

fear for its grip on the industry; making them more than willing to indirectly fund the conflict in Sierra Leone until international outcry reached its peak (Spar, 2006).

The war fare during this period brings unmeasurable suffering to the peoples of this region as hundreds of thousands of people were killed. At the root of this regional period of conflict is the arbitrary nature of post-colonial boundaries within the West African rainforests and colonial era concession companies attempting to maintain steady profits at all costs. The brutality against civilians and the rural setting of most of the conflict greatly disrupted local agriculture; driving people into the capitals of Monrovia and Freetown by the thousands. Firestone and DeBeers were reluctant yet indifferent non-state actors within these conflicts. Both would ultimately act to preserve their economic assets above all else. The damages caused by this conflict have stymied economic development in Liberia and Sierra Leone; compounding these peoples' poverty.

### **The Congo: A Toxic Relationship between Power and its People**

The quintessential example of the experience distant state is the Democratic Republic of the Congo. The former colony of Belgium is one of the largest countries on the African continent. Both the former colonial government and current government are based out of the Congo River port of Kinshasa (formerly Leopoldville). Directly across the Congo River from the former French colonial capital of Brazzaville, Kinshasa sits 200 miles up the river from the Atlantic Ocean, but yet over one thousand miles from areas of its eastern border.

The foundations of the modern state of the Democratic Republic of Congo, like many African nations on the Atlantic coast, started with the Atlantic slave trade. The Portuguese were the first European power to establish a presence on the Congo River and established hubs for slaves to be exported mainly to Brazil and Caribbean sugar colonies. Like most European

activity in Africa during the pre-industrial period, the Portuguese activity was centered on coastal areas. The only trace of European influence that could be felt by the people of the Congolese interior was the ever widening commodity frontier of the Atlantic slave trade. This indirect contact would start to establish an indirect zone of influence surrounding this coastal and down river core. Outside of this relatively small area, political and economic relationships were localized around a dozen or so kingdoms found within the interior and in east. These states were completely independent from polities located at the mouth of the Congo River and many might have never made contact with people from that area.

The establishment of the Congo Free State, starting in 1876, marks the birth of the modern Democratic Republic of Congo as a single political unit. In an act of fore-shadowing executive power of this polity, King Leopold II of Belgium would rule over the Congo Free State as his own personal estate until he was forced to relinquish it to the Belgian state in 1908, while embezzling over 2 million francs. This new political unit would be centered around the old Portuguese zone of influence and would extend its rule along the entirety Congo river with the help of a fleet of steamships and a rail road line that by-passed impassible rapids. This made resource extraction and communication with Leopoldville possible (Hochschild, 1999).

The brief history of the Congo Free State would be defined by the rubber terror. In the years following the recognition and consolidation of Leopold's colony, global demand for rubber exploded. As other European empires scrambled to establish rubber plantations, King Leopold at an equally frantic pace sought to exploit the wild rubber found in the Congo Free State in the decades before the rival colonial rubber plantations could reach maturity. In the effort to maximize extraction levels Congo Free State agents would enslave large numbers of local Congolese as porters to bring rubber to the steamships, kidnap members of villages that did not

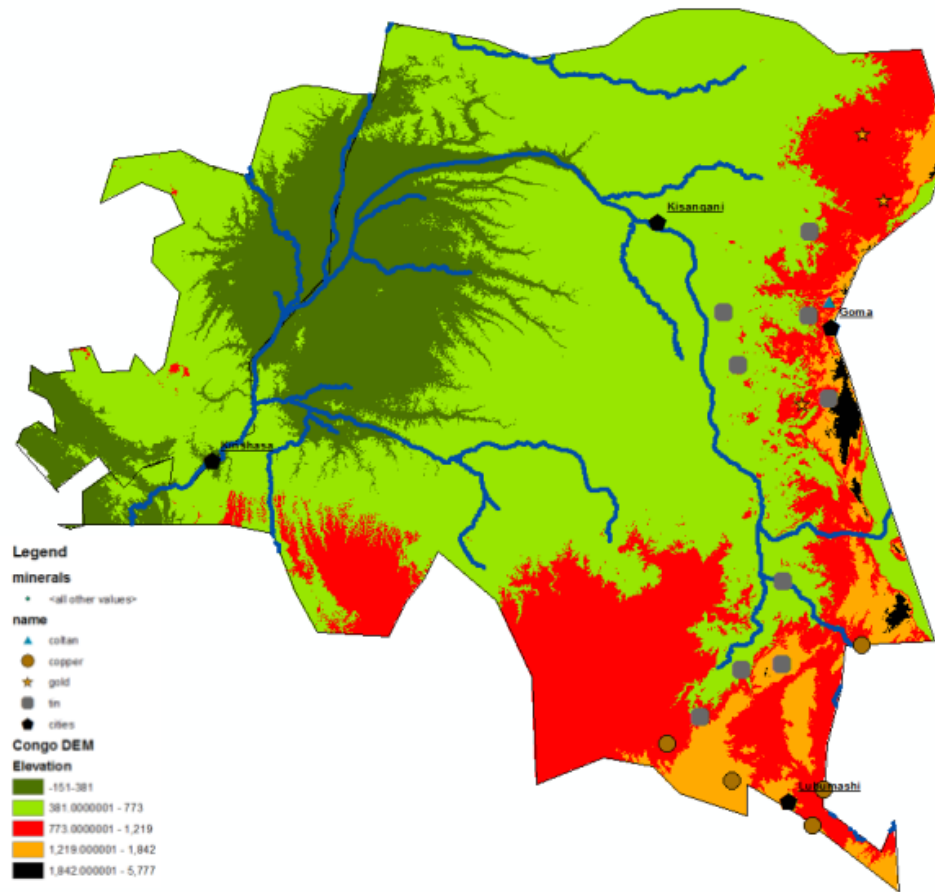
reach rubber output quotas, and chop off the hands of anyone who resisted (Hochschild, 1999). Millions of Congolese would die directly at the hands of Free State Administrators or from starvation as the emphasis on rubber extraction took much needed manpower away from sustenance agriculture. The Congo Free State would produce roughly 52 thousand tons of rubber by the time of the Belgian takeover (Mitchel, 2003).

The Belgian government renamed the Congo Free State into the Belgian Congo. While ruling with less brutality than King Leopold, the Belgian government did little to improve the lives of its Congolese subjects. The stunning brutality that would define the Congo Free State would be replaced with a more standard model of colonial oppression; little toleration of dissent and limitation of economic activities. Labor taxes were imposed in order to force populations into the mines of Eastern Congo (much like the Spanish in Peru) to extract gold, tin, and copper as the British rubber plantations had reached maturity, outproducing the Belgian Congo by 1910 (Mitchel, 2003).

The rapid de-colonization of the 1960's would result in the election of Patrice Lumumba. However, American fears over his leftist leanings resulted in their backing of a coup that resulted in ouster and assassination. By 1965 Joseph Mobutu would consolidate power, and rule with an iron fist for almost 30 years. Corruption, cronyism, and brute force would be the hallmarks of the Mobutu regime, as Mobutu bribed and or crushed any possible challenger to his power. Mobutu would steal over \$5 billion from the DRC (mostly through foreign aid) and give away countless millions to keep his cronies in line (Powell, 2012). Mobutu would eventually be overthrown by rebels from eastern Congo in 1994 by a wide coalition including a significant portion from Rwanda; leaving behind a legacy of violence, corruption,



In this post-Mobutu DRC, the standard of living for the Congolese people has changed very little, and centralized control of the eastern regions of the nation is more a hopeful aspiration than a reality. The spill-over of the Hutu-Tutsi conflict (that resulted in the Rwandan genocide) in the Democratic Republic of Congo has continued well beyond the end of hostilities in 2002. This eastern region is host to over a dozen armed groups or self-defense forces that have establish a series of fluid insurgent states, existing in various states of conflict with each other and the government. These groups have fought to control the extraction and transportation of gold, tin, and coltan (vital in production of cell phones). The porous borders with Rwanda and Uganda have allowed these materials to leave the DRC by the ton, despite the efforts of the international community (IPIS, 2015)



**Figure 11: DEM of the Republic of Congo and the Democratic Republic of Congo with conflict mining regions added.**

**Source: USGS. UN and BBC.**

For the citizens of the Democratic Republic of Congo, the concept of the nation-state is an imposed notion cemented in force and embodied by the brutal and corrupt King Leopold II and Joseph Mobutu. Here, along with many other areas in the African interior and former Soviet central Asian Republics, the Westphalian notion of internationally negotiated and recognized states gives way as the state struggles to establish sovereignty. As the Belgian forces attempted to maintain sovereign control of lucrative wild rubber resources with limited manpower they resorted to a combination of brutality, a repressive iron grip, and the subcontracting of these two through various indigenous intermediaries as a force multiplier. The ascension of Joseph

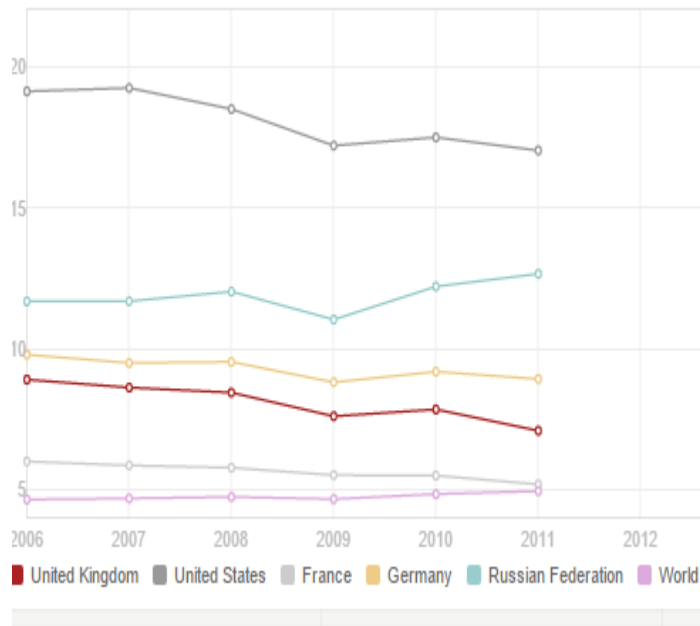
Mobutu built upon these legacies abuse and extraction. The authority of the Kinshasa government is as non-existent today within the dense rainforest of the central and east of the country as was the governments of the Belgian Congo and the Congo Free State. The factionalism installed by Belgians is playing itself over the mineral rich eastern regions. The negative legacies of the state combined to greatly hinder development in the Democratic Republic of Congo and have created an environment that promotes internal conflict; producing millions of refugees and IDPs as well as the largest UN peacekeeping mission on record.

## **Colonialism and Climate Change**

In the pre-industrial period, European colonial empires were restrained to trading ports and the coastal plains as topographic (most notably the African continental escarpment) and logistical barriers. These barriers proved impenetrable for centuries because of the shortcomings of the standard mode of transportation of the era; wind and current power. Inland transportation was confined to navigable rivers, as canals are too cost and labor intensive to be the heart of an expansive transcontinental transportation network. This combined with the temporal variability and risk and variability of oceanic travel during this period made supplying, maintaining, and communicating with colonial garrisons/administrative in remote regions a constant struggle; especially when presented with the gauntlet of tropical diseases. The obvious exception to this was colonial expansion in the Americas during this period. However this had far more to do with microbial decimation of the geographically isolated peoples of the “New World”. The paradigm shift brought about by the steam engines that powered the railroads and ships of the industrial era of colonial imperialism would bring about annihilation of spatial-temporal barriers that had separated global economic activities into several isolated regional trading networks and made the exponential growth of colonial powers in Africa and Asia during the Industrial Period.

The fall of these spatial-temporal boundaries resulted in a truly globalized economy. The creation of this massive network, for good and for bad, would not have been economically feasible without the iron-fisted grip the global colonial powers using monopolistic and often predatory trading policies used by colonial empires. The resulting economic system was based off of the constant use of fossil fuels to over-come the spatial-temporal obstacles to global trade. This globalized economy also encouraged newly independent nations to emulate the societies of their former colonizers and attempt to develop into a consumer capitalist nation-state; all of which is based off of unsustainable use of fossil fuels and other resources.

The global transportation network that arose would become so inexpensive and efficient that trends of industrial location were turned completely around as labor became the prohibitive cost in industrial production. From the dawn of civilization up until the mid-20<sup>th</sup> century shipping/transportation was the most expensive aspect of trade, and therefore, only the highest quality luxury items could be economically feasible to transport outside of local markets. Up until the Industrial period of colonialism, transportation was also the prohibitive cost regarding raw materials used in products. The networks connecting industrial colonial powers to inexpensive raw materials would facilitate the fundamental changes of industrial location. These changes would result global supply chains and industries with a spatial footprints growing at a staggering rate; with resulting carbon emissions.



**Table 4: CO2 emissions per capita.**

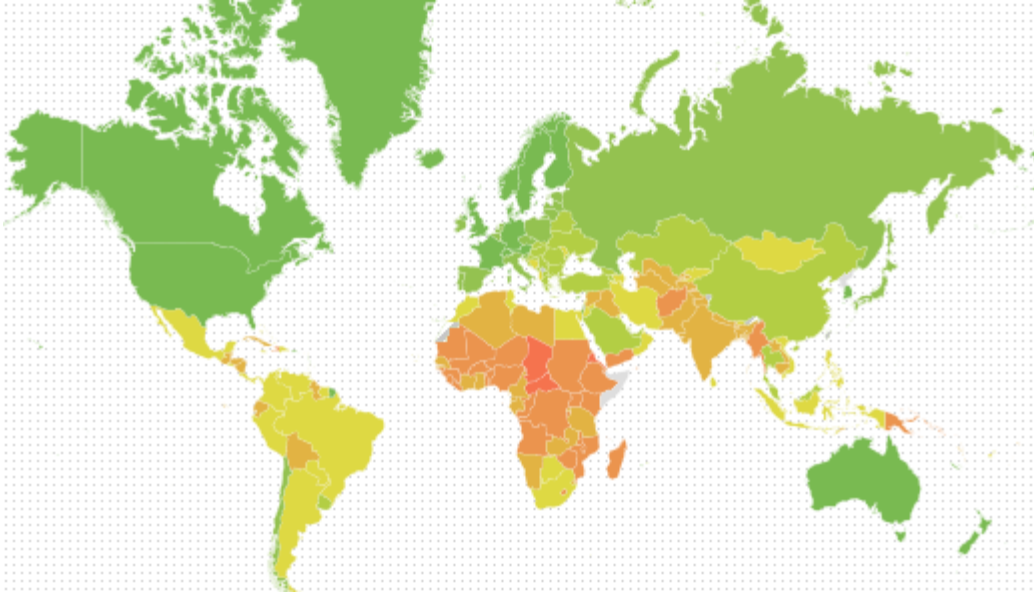
**Source: World Bank**

International shipping is the vascular system of this fossil fuel driven global economic network. Over 90% of the world's trade is sent via sea, over routes and using technologies perfected used by imperialist powers to maintain control of their over seas colonies. Shipping produces well over 1 billion tons of Carbon Dioxide into the atmosphere a year, and if the global shipping fleet were a nation it would be in the top ten Carbon Dioxide emitters on the planet; thus adding a further dimension within humanity's carbon footprint (George, 2013).

The global imperial powers discussed previously have played a major role in creating the crisis of climate change that will face the people of this planet in the up-coming century. These powers have consistently been the largest producers of CO2 emissions historically, and are still some of the largest emitters per capita today (IPCC 2013: The Physical Science Basis, 2013). Yet, the majority of these nations are located within the mid-latitudes and will not bear the brunt of negative impacts resulting from the potential climate change. Below is a visualization of Notre Dame's ND-Gain Index which illustrates how prepared nations are for climate change impacts it will face based off a series of vulnerability and readiness factors. This clearly shows

the disparity in between former colonizers and former colonies in terms of climate change related risk going into the future.

**Figure12: The ND-Gain Index on a red to green color ramp going from most to least vulnerable**



### **Islands as Center of Colonialism and Climate Change**

Islands have been a target for colonial empires for centuries because of a few geographic factors. The fact that most global imperial powers relied heavily on their navies both as a logistical tools as well as a force multiplier in combat, meant that islands were particularly vulnerable to colonial empires. The geographic isolation that islands provided was ideal economic domination, because naval power could effectively make the colonial power a buffer in between the island and the rest of the global economy, effectively allowing them to control imports and exports. Also this isolation lent itself to the pre-industrial slave driven cash crop production, because of the fact that continental locations often offered better chances the of escape for slaves. Many mid-oceanic islands would prove to be vital refueling station for the steam and later oil powered ships.

The experience of the islands under colonial rule has resulted in poverty, underdevelopment, and economic dependence on exports; all of which increase the difficulties of

handling the effects of anthropogenic climate change. Sea rise and declining health of the world's coral reefs poses a major threat to the existence hundreds of low lying coral islands across the globe (IPCC 2013: The Physical Science Basis, 2013). Island ecosystems' extreme vulnerability to climate change is because of the fundamental fact that these systems are closed loop systems that are tied into global systems. As the global climate systems tighten the loop on island ecosystems, these unique ecosystems could be squeezed out of existence; while potentially making millions of people stateless within the next century. Even island nations located on higher ground could be rendered uninhabitable as their freshwater supplies are compromised due to greater wastewater pollution resulting from inter island migration, increased rainfall variability, over use of surface water resources, possible encroachment of salt water into groundwater supplies, and the socio-economic restraints on developing desalination (IPCC 2013: Impacts, Adaptations, and Vulnerability, 2013). The poverty brought about in many island nations by slavery and other exploitive economic experiences as well as declining future economic productivity due to climate change factors will undermine future climate change preparations and adaptations.

## **Indonesia**

At the intersection of violent post-colonial legacies and future climate change risk factors is the nation of Indonesia. The archipelago of Indonesia was cursed by its strategic location to fall under the control of global imperial powers. The island nation controls several choke points within the Indian Ocean and was the sea trade gateway to China and Japan; with the Strait of Malacca being the metaphorical carotid artery of Asian trade for centuries. Throughout Indonesia's history, it has been at the center of the Indian Ocean trade network, which would spread Islam within the nation as well as bring about the rise of first the Portuguese and later the

Dutch. The archipelago was unified as a centralized state for the first time in its history under Dutch colonial rule that would come to an abrupt end with the end of the Second World War. The nation that would emerge would be one fighting great centrifugal forces, with the two major ethnic groups of the island of Java forming over half the nation's population in a nation of hundreds of different ethnicities scattered over thousands of scattered remote tropical islands.

The unification of modern day Indonesia began with the rule of the previously mentioned Dutch East India Company. Company rule would be centered out of Batavia (present day Jakarta) on the island of Java. The *VOC* sought to establish itself as spice cartel to maintain profits over the long term in order fund the mechanisms of control (Koot, 2015). These ends were accomplished with fraudulent treaties, treat of or use of military force in the archipelago. The *VOC* operated with very little oversight from the Dutch government, as communications took over a year to travel from Bratavia to Holland and back. In Europe, the *VOC* would stockpile its goods in warehouses and sell small portions of their goods off in auctions (Adam, 1996). This would keep the supply low while demand was at its peak, and gave the *VOC* the opportunity to flood the market in order to crush competitors. However, by the end of the 17<sup>th</sup> century the British East India Company had flooded the spice market and had dealt the *VOC* several military defeats. This coupled with the corruption that ran rampant within the *VOC* resulted in the Dutch government taking direct control in the beginning of the 19<sup>th</sup> century.

The financial collapse of the *VOC* made the following Dutch administrations very cautious about expanding its territorial presence throughout the archipelago for decades. The government would even go as far as explicitly forbidding any expansion of Dutch holdings in 1840. For the next 60 years, Dutch activities would be concentrated within a general proximity to the Javanese core of the territory. The beginning of the 20<sup>th</sup> century saw the Dutch change



tactics and actively control areas within its sphere of influence and take control of all territory that encompasses modern Indonesia. Despite this territorial consolidation at the turn of the century, the Dutch still left a very small footprint on the peripheral islands (Locher-Schoten, 1994).

Dutch rule over the islands would be broken (as would most European holdings in Asia) by the Japanese during World War II. The Empire of Japan's meteoric rise and fall failed in establishing long term extractive colonies, because of its defeat at the hands of the Allied powers. It did succeed in showing the people of Southeast Asia (the people of French Indo-China and the Dutch East Indies) that their colonial powers grip on these countries was no-where near as strong as imagined. Following the defeat of Japan in 1945, Indonesian nationalists declared independence for the Dutch. After a failed, 5 yearlong "police action" by the Dutch military, the independence of Indonesia was recognized by the international community in 1949 (Locher-Schoten, 1994). In 1960, the leftist president of Indonesia suspended the constitution and in 1965 a failed coup resulted in military rule being established over the country; marked by an anti-communist purge that killed hundreds of thousands of people (Zurbutchen, 2002).

Many in the archipelago saw this new Indonesian state simply as another re-iteration of colonialism; only at the hands of the Javanese as opposed to the Dutch. Centrifugal forces have resulted in several self-determination conflicts following independence in Aceh, West New Guinea, and East Timor. West Guinea and East Timor were both annexed by the Indonesian government in 1963 and 1975 respectively after the end of colonial rule in these territories, while Aceh (located in Northern Sumatra) has been at war in some degree with the government in Jakarta since 1973 (Kadir, 2014). The anti-communist military junta, referred to as the "New Order", would see these self-determination movements as a threat to the existence of the entire

nation, and would put the separatists down with brutal force. Indonesian military forces were particularly brutal in East Timor with 170,000 people either being executed or starving to death during the 24 year occupation. This coupled with the international exposure the issue of East Timor independence received and the collapse of the New Order regime in 1998 resulted in the UN granting the territory its independence after a UN-backed referendum in 1999 (Kiernan, 2003). Even under civilian control, the Indonesian military launched a reprisal campaign against the people of East Timor. The United States and the rest of the anti-communist powers of the Cold War would support this brutal New Order regime out of fear that Indonesia could be the next domino to fall to communism (Zurbutchen, 2002).

Brute force was not the method that the central government in Jakarta used in order to maintain control. The previously mentioned transmigration programs have had transparent political goals to them. Over the quarters of a million people were relocated to Western New Guinea to decrease centrifugal forces in a region that had previously attempted to resist its incorporation into Indonesia in the 1960's and 1970's. Although these programs have helped lift

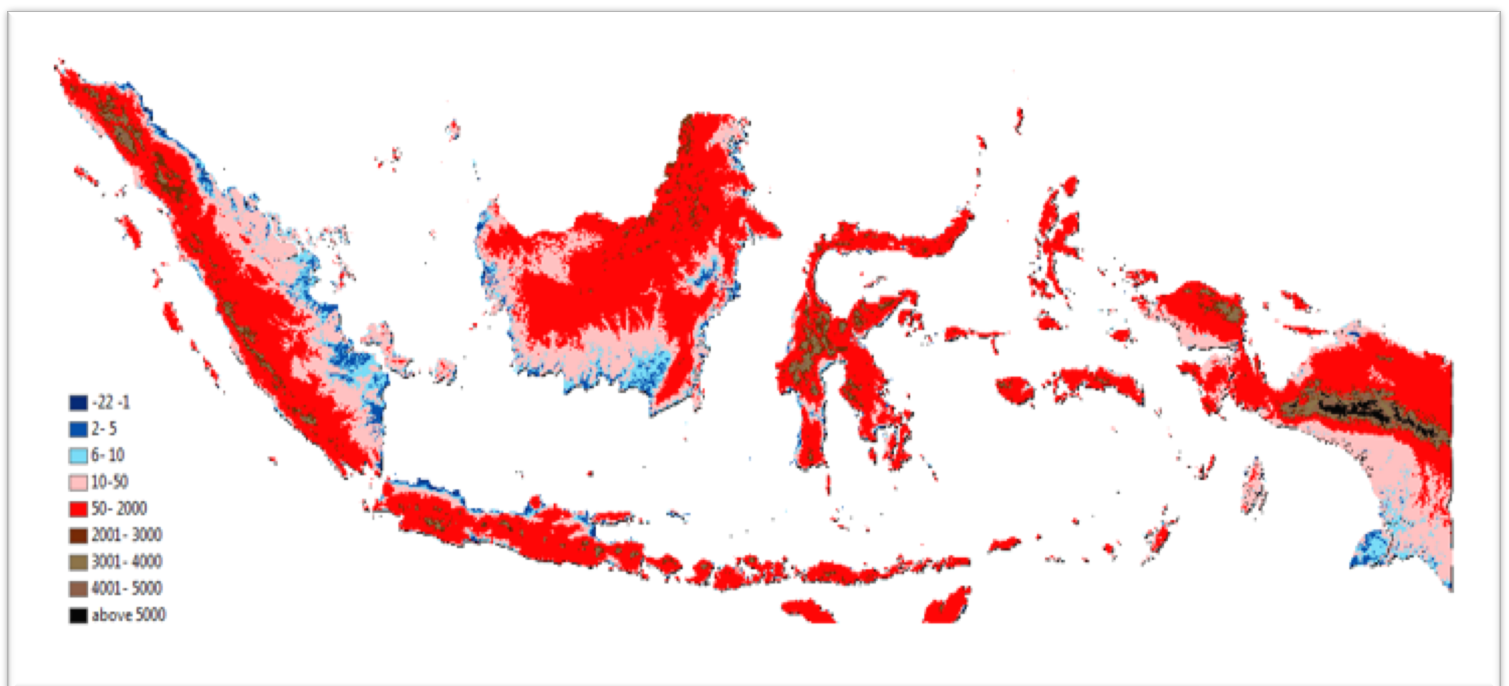


Figure 13: Digital Elevation Model showing areas under climate change [risk](#)

hundreds of thousands of people out of poverty, these programs are by no means altruistic. Transmigration has been used as a tool to uproot and isolate political prisoners by the thousands. Also transmigration has been used as a justification for demolishing and or relocating slums on Java (Kadir, 2014).

Above is a DEM conditioned to model impacts of sea rise on the nation of Indonesia and below is a population density map based off of Center for International Earth Science Information Network - CIESIN data. Areas in navy colored zone, covering 7,854 square kilometers, are at risk of going underwater in a one meter sea rise scenario. Although this only covers less than 1% of the total landmass, it includes some of the most heavily populated areas on Java and Sumatra. The blue and light blue areas that combine to make up 8.5% of the total land (3% and 5.5% respectively) are areas that could be affected in worst case climate change scenarios either by sea rise or by storm surge. These areas would also see a high level of seawater intrusion into ground water supplies. Pink areas that make up 27% could also face sea

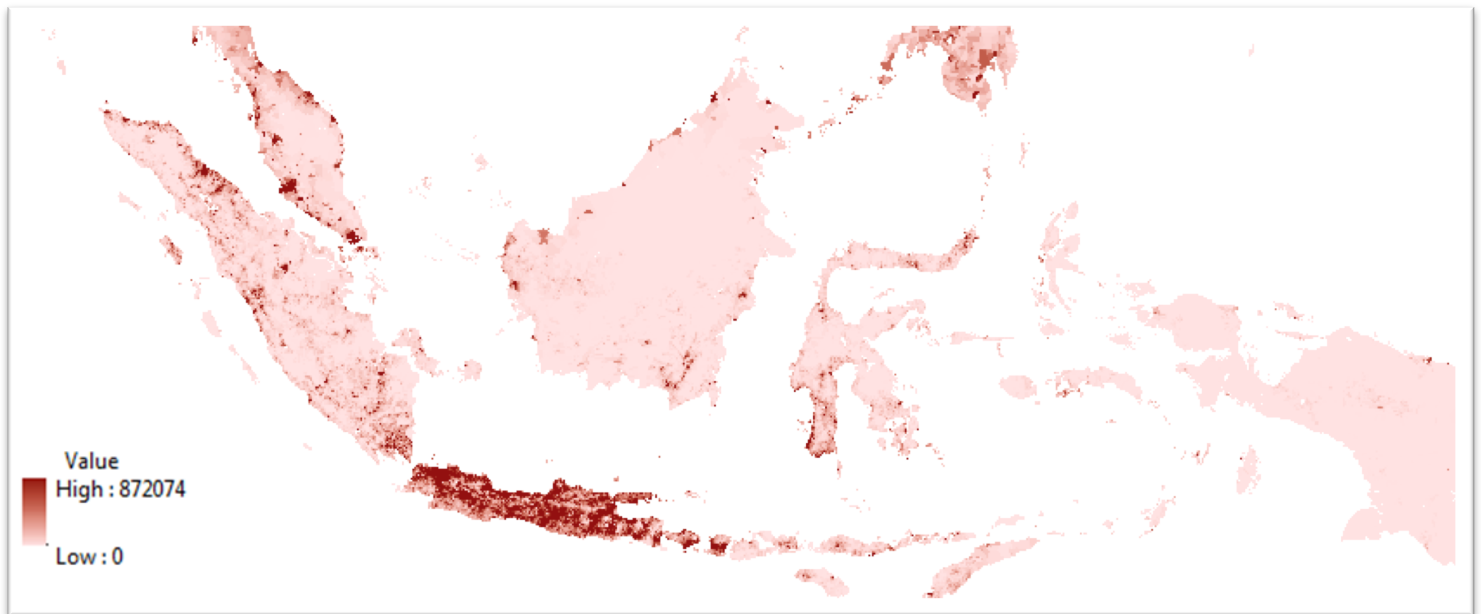


Figure 14: Population Density map of Indonesia

water intrusion, which in combination with less predictable precipitation could greatly undermine agriculture (Wener & Simmons, 2009).

The Indonesian state is a geo-political powder keg that could easily be ignited by climate change pressures on existing issues of tension. Sea rise, large numbers of people displaced by natural disasters, and less dependable agriculture could become an ignition source for a violent conflict that would have a massive impact on the global economy. The historic use of force as a deterrent against self-determination movements by the government in Jakarta has created a watershed of distrust and ill-will within the outer islands, which could act as an accelerant; seeing violence quickly spread across the archipelago. Any conflict or natural disaster on the island of Java would ultimately displace millions towards the outer islands, which in turn, could incite separatists' sentiment as a cultural response to a rapid transmigration. In a scenario where impacts of climate have increased political centrifugal forces, the Indonesian government could feel pressure to respond with a heavy hand in order to maintain unity; which could quickly escalate the level of violence in a conflict. The violent collapse of the Indonesia state into dozens of smaller states would disrupt economic activity within the Indian Ocean and could put the oil supply of many Asian nations along the Pacific coast at risk. The international pressure that would be applied to any hypothetical conflict would likely prolong the conflict and increase the long term negative impacts.

An internationally prolonged, violent collapse of the Indonesian state would be devastating to the environment of the region. This hypothetical conflict would most likely be fought in the increasing fragile tropical rainforest ecosystems of Sumatra, West Papua New Guinea, and Borneo; devastating thousands of acres with damage from artillery fire, air/naval bombardment, and minefields. The hypothetical conflict would displace hundreds of thousands

of people in a region with a historical reluctance to accept refugees forcing people either into the over populated island of Java (possibly pushing the island's carrying capacity towards the point of collapse) or onto smaller outer islands (compounding issues for deforestation and loss of biodiversity).

### **Primate Cities and the Coastal Core Region**

Colonial control and development was by no means uniformly distributed. As previously discussed, most colonies under the control of global empires started under the trading post empire model of the pre-industrial period. As these colonies spread inland over time, areas along the coast would become the colonial core (often with a few major port cities as the vey epicenter) with the inlands areas becoming colonial periphery (often referred to as sphere of influence). The cities that would form the colonial epicenter would become centers of colonial administration, infrastructure development, and economic investment.

The benefits of being the center of the colonial state had many social and economic benefits to colonial epicenter cities. However these benefits appear as more of a curse following the end of colonial rule; a curse compounded by impacts of climate change. Climate change will result in increased variability in precipitation and annual temperature around the globe, and thus will undermine agriculture around the world. Several bad harvests could be fatal to the millions of people living in post-colonial societies, barely living on the edge of subsistence. Regional agriculture failure will drive thousands at a time towards these regional primate cities. The vast a majority of these rural climate migrants will find themselves among the over 860 million slum dwellers around the world (Marx, Stocker, & Suri, 2013). Many post-colonial primate cities have seen rapid population explosions 20 years and are still struggling to keep up with rapid increase of need of housing and public services.



**Figure 15: West Point slums in Monrovia.**

**Source: Google Earth**

The city of Monrovia is the capital of Liberia with a population around 1 million people. Monrovia is a primate city as it has well over ten times the population of the next biggest city in the country. Monrovia is a perfect example to model the hypothetical impacts of regional agriculture failure on the regional primate city. The agricultural practices of western Africa are both labor and cycle dependent. The decade of internal conflict from 1990-2000 displaced a large numbers of rural people into the city on Monrovia; resulting in the population doubling in between 1980 and 2000 (Mitchel, 2003). These migrants mostly ended up in the slum of West Point within the city. Lacking electricity, social services, and sanitation, this area covers less than a quarter square mile in area is home to roughly 75 thousand people (Marx, Stocker, & Suri, 2013). This area would be one of the hardest hit areas by the recent Ebola outbreak because the open sewers a high population density makes West Point slums a petri dish for water borne diseases.

While the migratory pressures of the Liberian civil wars would eventually end, climate change related pressures could cause near cancerous levels of growth in former colonial primate cities. Issues with sea rise will only complicate these risks as coastal slums will be forced to become even denser and rising seas could compromise sanitation systems. Greater numbers of people cramped into slums be improvised at even faster speeds would be a recipe for disaster if a major hurricane or other natural disaster were to occur. It would be an unprecedented humanitarian disaster if a major city, that had already become a migration hub due to climate change pressures, was rendered uninhabitable by disease and natural disaster; plunging the rest of the nation into chaos because the political and economic center of the nation was compromised.

## Migration

Climate change will be felt incredibly hard in semi-arid regions in the lower latitudes; especially those regions within the drought belts of the southern hemisphere (IPCC 2013: Impacts, Adaptations, and Vulnerability, 2013). As desertification increases while agriculture and seasonal rain patterns become less dependable, people surviving on agriculture on marginal lands will be displaced as the carrying capacity of these regions shrink. This displacement will compound regional tensions and could have the potential to start or prolong armed conflict. This is currently being manifested by the Mediterranean migrant crisis that has overwhelmed many European and Northern African nation's immigration systems, as tens of thousands of Sudanese, Eritreans, and immigrants from across West Africa join the refugees of Syria and Afghanistan attempting to enter Europe at any cost.

Climate change driving human migration is not an unprecedented phenomenon. The backdrop of the pre-industrial colonial period was a 300 year period of global cooling, known as

the “little ice age” (MacCracken & Perry , 2002). Territories in the temperate zones of the mid latitudes in both the northern and southern hemisphere saw increased flooding, precipitation variability, longer cold spells accompanied by a general decline in agricultural productivity. This general decline in domestically available resources could easily influence nations to seek to compensate for this gap with the establishment of over-seas colonies of the purpose of resource extraction. These same centrifugal forces could just as easily influence individuals to go settle these colonies and to engage in expeditions to find new colonies or trade routes.

### **Transnational Armed Groups in the Sahel**

The Sahel region of Africa is a ring of Savannahs that act as a buffer in between the Sahara to the north and rain forests of central Africa to the south; spanning the nations of Sudan, Chad, Niger, Mali, Senegal, and Burkina Faso. Declining annual precipitation and growing populations in the region have created a feedback loop that is expanding the Sarah further into the Sahel (Gonzalez, 2001). Some estimates suggest that the carrying capacity of the region is falling behind its population density. These trends will only increase in severity with the climate change of the coming decades. A major drought could cause a devastating famine throughout West Africa that could have the potential to kill millions and displace millions more. To date the increased desertification in the Sahel has played a major role in two recent conflicts, and will likely be a force of political destabilization and armed conflict going into the future.

The landlocked nation of Chad is located is the very center of this climatically dynamic region. This former French colony is one of the poorest nations on the planet and has been riddled with political infighting for decades. This has given rise to a regional warrior class with loyalties as arbitrary and fluid as the regional borders. With almost zero economic alternatives, these rebels for hire float through Sudan, Chad, and the Central African Republic from rebellion



to rebellion (Debos, 2008). These Chadians were heavily recruited by the Sebeka rebel alliance that overthrew the government of the Central African Republic in 2013, sparking a brutal cycle of reprisal violence against civilians along religious lines. Climate change in the Sahel region acted as a force of displacement, driving these bands of armed Chadians south and east.

The other Sahelian conflict that will be analyzed is one that is driven by encroachment, rather than displacement. As the Sahara expands into the Sahel region, so does the influence of the Saharan nomad tribes; thus altering the political calculus of many nations within the region. The 2011 overthrow of the Qaddafi regime in Libya and the subsequent Tuareg rebellion in Mali is proof of this in action. The Tuareg tribes of the Sahara were supporters of the former Libyan regime, and fought against the NATO backed rebellion of 2011. Following the defeat of their allies in Tripoli, the Tuaregs crossed the desert into northern Mali with all of the weapons that they could carry. Seizing the opportunity after a failed coup attempt in Bamako, the Tuaregs seized control and declared their own independent state (Ronen, 2013). This rebellion would later be hijacked by Al-Qaeda in the Maghreb and put down with the help of a French military intervention, but it represents another possible destabilizing variable in countries dealing with climate change impacts.

Climate Change induced displacement will have disproportionate adverse impact on former colonial nations. A lack of international cooperation this issue of resettling displaced peoples highlighted by the Syrian refugee crisis, will most likely result in the vast majority of future displaced people will end up in regional core economic regions; to either seek refuge there or to use it a point of transition towards somewhere in the global core (United States, Europe , Etc.). These pressures could likely upset the delicate balance of ethnic and political powers in

many experience distant nations; thus causing a feedback loop where displacement and trigger conflict that can in turn compound the issues of displacement.

## Conclusion

Harm de Blij once stated that, “the emergence and diffusion of modern humanity is a drama whose scenes are still being reconstructed and whose back drops are still being painted.” The backdrop of the 21<sup>st</sup> century has been painted on top of the political, economic, social, and environmental systems that make up the backdrop of the global imperial era. Many patterns and colors that compose the backdrop of the global imperial era seep through into this 21<sup>st</sup> century backdrop. Many of these colors metaphorically seeping into the 21<sup>st</sup> century are the environmental scars produced by the endless pursuit of surplus extraction that defined the colonial powers of Spain, Portugal, Great Britain, France, Germany, the United States of America, Russia, and Italy. The scars of global imperialism will long outlive the empires who gauged them onto the Earth, because of the infinitely longer turn overs rates in natural systems feedback loops compared to those in political systems. What is popular politically for a matter of decades can cause damages that will take centuries to play out that will destroy something that took millennia to create. Many of these economic and political systems that produced these short-sighted scars are being reconstructed but with new actors and old actors playing different roles. The global imperial system was defined by systems of unequal exchange and linear computation of land, raw materials, and markets that would become the bedrock of today’s modern economy. In order to ensure a sustainable future for humanity, we must recognize when we recognize new actors reading from the global imperialist script and understand what paths that leads down.

The most prolific scars of global imperialism are the ones that became economic institutions within the post-colonial nations. These newly independent nations, impoverished by the unequal exchange, often had little choice but to double-down on the extractive infrastructure left by their former colonial power. This was the case for Nigeria, Liberia, Nauru, and countless other nations who became entrapped in a mono-commodity economy; further degrading environment out of imposed economic need. These economic conditions often compounded the un-even development of nations, as outside special interests and post-colonial elites often saw the lion's share of wealth produced through this extractive process. Many post-colonial nations also built upon the authoritarian political structures by in place by colonial powers in order to extract total submission of large territories. This process creates experience distant states, with nominal sovereignty of large swathes of its territory. Countries like the Democratic Republic of Congo, that struggle to control its own borders and territory, cannot be expected to properly manage wildlife and natural resources while simultaneously mitigating the environmental damage left behind by its former colonial power.

The former colonial powers imposed the Euro-centric capitalistic model of modern development on to the rest of the world over a 500 year span. The development of the modern industrial economies in Europe and America came at the expense of their colonies. It has become clear that the long term consequences of this global capitalist model are beginning to impact the planet as a whole, in the form of climate change. The former colonial powers must recognize that they are not only responsible for the majority of carbon emissions, but for putting an unsustainable system in place against the will of millions of people. Placing the global colonial empires in their historical, political, economic, environmental, geographic context defines the obligation the former imperial power have to their former colonies. As their former

colonies bear the majority of negative impacts over the coming decades, these powers need to live up to this obligation, not with words in a semi-annual conference, but in action towards building a more sustainable global system.

## Works Cited

- Adam, J. (1996). Principals and Agents, Colonialists and Company Men. *American Sociological Review*, 12-28.
- Binns, T., Dixon, A., & Etienne, N. (2012). *Africa: Diversity and Development*. Francis and Taylor.
- Coates, K. (2004). *A Global History of Indigenous Peoples*. London: Palgrave MacMillen.
- Cohen, W., & O'Boyle, M. (Directors). (2014). *Frontline Presents: Firestone and the Warlord* [Motion Picture].
- Debos, M. (2008). Fluid Loyalties in a Regional Crisis: Chadian 'Ex-Liberators' in the Central African Republic. *African Affairs*.
- Dos Santos, D. (n.d.). Cabinda: The Politics of Oil in Angola's Enclave. *Department of Sociology, University of Montreal*, 101-111.
- Enneking, L. (2004). The Future of Foreign Direct Liability? Exploring the International Relevance of the Dutch Shell Nigeria Case. *Utrecht Law Review*, 44-54.
- Fairhead, J., & Leach, M. (200). Desecration and Domination: Science and Struggles over the Environment and Development in Colonial Guinea. *Journal of African History*, 35-54.
- Fisher, J. (1998). Commerce and Imperial Decline: Spanish Silver Trade with Spanish America 1797-1820. *Journal of Latin American Studies*, 459-479.
- Fletcher, M. (1958). The Suez Canal and World Shipping, 1869-1914. *Journal of Economic History*, 557-573.
- Flint, C., & Taylor, P. (2011). *Political Geography*. Edinburgh: Pearson Education Limited.
- Frynas, J. (2001). Corporate and State Responses to Anti-Oil Protest in the Niger Delta. *African Affairs*, 27-54.
- George, R. (2013). Inside the Secret Shipping Industry. *TED@ BCG Singapore*. Singapore: TED.
- Gonzalez, P. (2001). Desertification and a Shift of Forest Species in West African Sahel. *Climate Research*, 217-228.
- Gordon, D. (2009). The abolition of the Slave Trade and the Transformation of South-Central African Interior during the Nineteenth Century. *Omohundro Institute of Early American History and Culture*, 915-938.
- Gowdy, J. M., & McDaniel, C. N. (1999, May). The Physical Destruction of Nauru: An Example of Weak Sustainability. *Land Economics*, 333-338.
- Hochschild, A. (1999). *King Leopold's Ghost*. Mariner Books.

- (2013). *IPCC 2013: Impacts, Adaptations, and Vulnerability*. UN.
- (2013). *IPCC 2013: The Physical Science Basis*. UN.
- IPIS. (2015). *Mineral Supply Chains DRC Due Diligence Report*.
- Jarosz. (1993). Defining and Explaining Tropical Deforestation: Shifting Cultivation and Population growth in Colonial Madagascar. *Economic Geography*, 366-379.
- Kadafa, A. (2012). Cabinda: The Politics of Oil in Angola's Enclave. *Civil and Environmental Research*, 38-51.
- Kadafa, A. (2012). Oil Exploration and Spillage in the Niger River Delta. *Civil and Environmental Research*, 2222-2863.
- Kadir, Y. (2014). Revisiting Self-Determination Conflicts in Indonesia: An International Law Perspective. *Indonesian Law Review*, 124-139.
- Kiernan, B. (2003). The Demography of Genocide in Southeast Asia. *Critical Asian Studies*, 585-597.
- Koot, G. (2015). *The VOC: the Dutch East India Company, 1602-1799*. History Department, University of Massachusetts Dartmouth.
- Locher-Schoten, E. (1994). Dutch Imperialism. *Journal of Southeast Asian Studies*, 135-183.
- Lopez-Carr, D., Pricope, N., Aukema, J. E., Jankowska, M. M., Funk, C., Husak, G., et al. (2014). A Spatial Analysis of Population Dynamics and Climate Change in Africa: Potential Vulnerability Hot Spots Emerge where Precipitation Declines and Demographic pressures Coincide. *Population Environments*, 323-339.
- MacCracken, M., & Perry, J. (2002). Little Ice Age. *The Earth System*.
- Manner, H. I., Thaman, R. R., & Hassall, D. C. (n.d.). Phosphate Mining Induced Vegetation. *Ecology*, 1454-1465.
- Marchuk, I. (2009). Confronting Blood Diamonds in Sierra Leone: The Trial of Charles Taylor. *Yale Journal of International Affairs*, 87-99.
- Martin, P. (1977). The Cabinda Connection: An Historical Perspective. *African Affairs*, 47-59.
- Marx, B., Stocker, T., & Suri, T. (2013). The Economics of the Slums in the Developing World. *Journal of Economic Perspectives*, 187-210.
- Micklin, P. (1988). Desiccation of the Aral Sea: A Water Management Disaster in the Soviet Union. *Science*, 1170-1175.
- MIT. (2012). *Mission 2012: Clean Water*.

- Mitchel, B. (2003). *International Historical Statistics 1750-2000*. Palgrave MacMillian.
- Moore, J. (2000). Sugar and the Expansion of the Early Modern World-Economy: Commodity Frontiers, Ecological Transformations, and Industrialization. *Fernand Braudel Center*, 409-433.
- Moore, J. (2010). "This Lofty Mountain of Silver Could Conquer the Whole World": Potosí and the Political Ecology of Underdevelopment, 1545-1880. *The Journal of Philosophical Economics*, 58-103.
- Nriagu, J. (1994). Mercury Pollution from the Past Mining of Gold and Silver in the Americas. *The Science of the Total Environment*, 167-181.
- Obi, C. (2008). Oil Extraction, Dispossession, Resistance, and Conflict in the Oil-Rich Niger Delta. *Nordic Africa Institute*.
- Powell, J. (2012). Regime Vulnerability and Diversionary Threat of Force. *Journal of Conflict Resolution*, 169-196.
- Randrianarijaona, P. (n.d.). The Erosion of Madagascar. *Ambio*, 308-311.
- Ronen, Y. (2013). Libya, the Tuareg, and Mali on the Eve of the 'Arab Spring'. *Journal of North African Studies*.
- Roulet, M. (1999). Effects of Recent Human Colonialism on the Presence of Mercury in Amazonian Ecosystems. *Water, Air, and Soil Pollution*, 297-313.
- Severskiy, C., & Ponomarenko, N. (2005). *Aral Sea: GIWA Regional Assessment 24*. United Nations Environmental Programme.
- Shantz, J. (n.d.). Cabina: Africa's Forgotten War. *Under Currents*, 23-24.
- Sharp, L. (2003). Laboring for the Colony and the Nation: The Historicized Political Consciousness of Youth in Madagascar. *Critique of Anthropology*, 75-93.
- Sluyterman, K. (2010). Royal Dutch Shell: Company Strategies for Dealing with Environmental Issues. *Business History Review*, 203-227.
- Spar, D. (2006). Continuity and Change in the International Diamond Market. *American Economic Association*, 195-208.
- United Nations Environmental Programme. (2014). *The Future of the Aral Sea lies in Transboundary Co-operation*.
- Warf, B. (2011). Excavating the Pre-history of Space-Time Compression. *The Geographical Review*, 435-446.
- Welch Jr., C. (1995). The Ogoni and Self-Determination Increasing Violence in Nigeria. *Journal of Modern African Studies*, 635-650.

Wener, A., & Simmons, C. (2009). *Impact of Sea-Level Rise on Sea Water Intrusion in Coastal Aquifers*. NGWA.

Ziltener, P., & Kunzler, D. (2013). Impacts of Colonialism. *American Sociological Association*, 290-311.

Zurbutchen, M. (2002). History, Memory, and the "1965 insdient" in Indonesia. *Asian Survey*, 564-581.